55-1520-240-23-4/990

TM 55-1520-240-23-4

TECHNICAL MANUAL

AVIATION UNIT AND AVIATION INTERMEDIATE MAINTENANCE MANUAL

CH-47D HELICOPTER

This copy is a reprint which includes current pages from Changes 1-22.

HEADQUARTERS, DEPARTMENT OF THE ARMY

10 MAY 1983

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*TM 55-1520-240-23-4
C 22

CHANGE
NO. 22

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WASHINGTON, D.C., 17 May 1990

Aviation Unit and Aviation Intermediate Maintenance Manual

CH-47D HELICOPTER

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Remove pages	Insert pages
5-214.3 and 5-214.4	5-214.3 and 5-214.4
5-354.1 and 5-354.2	5-354.1 and 5-354.2
5-357 and 5-358	5-357 and 5-358
5-371 and 5-372	5-371 and 5-372
5-372.1 through 5-372.4	5-372.1 through 5-372.4

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*This TM Change 22 is a result of USAAVSCOM SOF Message 261900Z Apr 90.

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NO. 21

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Aviation Unit and Aviation Intermediate Maintenance Manual

CH-47D HELICOPTER

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Remove pages	Insert pages
---	5-14.1/5-14.2
5-15 and 5-16	5-15 and 5-16
5-19 and 5-20	5-19 and 5-20
5-29 through 5-32	5-29 through 5-32
5-33 through 5-36	5-33 through 5-36
5-53 through 5-58	5-53 through 5-58
5-58.1 through 5-58.4	5-58.1 through 5-58.4
5-79 through 5-86	5-79 through 5-86
5-163 and 5-164	5-163 and 5-164
5-175 and 5-176	5-175 and 5-176
5-195 and 5-196	5-195 and 5-196
5-211 and 5-212	5-211 and 5-212
5-217 and 5-218	5-217 and 5-218
5-292.7 through 5-292.9/5-292.10	5-292.7 through 5-292.9/5-292.10
5-306.1 and 5-306.2	5-306.1 and 5-306.2
5-311 through 5-314	5-311 through 5-314
5-323 and 5-324	5-323 and 5-324
5-325 and 5-326	5-325 and 5-326
5-326.1 and 5-326.2	5-326.1 and 5-326.2
5-343 through 5-346	5-343 through 5-346
5-347/5-348	5-347/5-348
5-393 and 5-394	5-393 and 5-394
5-449 and 5-450	5-449 and 5-450
5-453 through 5-456	5-453 through 5-456
5-495 and 5-496	5-495 and 5-496
5-513 through 5-516	5-513 through 5-516

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TM 55-1520-240-23-4
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CHANGE
NO. 20

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5-525 through 5-526.30	5-525 and 5-526

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Remove pages	Insert pages
5-37 through 5-40	5-37 through 5-40
5-41 through 5-44	5-41 through 5-44
5-47 through 5-50	5-47 through 5-50
---	5-50.1/(5-50.2 blank)
5-51 and 5-52	5-51 and 5-52
---	5-52.1/(5-52.2 blank)
5-53 through 5-56	5-53 through 5-56
5-58.1 and 5-58.2	5-58.1 and 5-58.2
5-79 and 5-80	5-79 and 5-80
5-87 and 5-88	5-87 and 5-88
5-170.13/(5-170.14 blank)	5-170.13 through 5-170.18
---	5-170.19/(5-170.20 blank)
---	5-214.7 and 5-214.8
5-234.5 and 5-234.6	5-234.5 and 5-234.6
5-236.5 and 5-236.6	5.236.5 and 5-236.6
---	5-236.6.1 through 5.236.6.4
5-251 and 5-252	5-251 and 5-252
5-259 and 5-260	5-259 and 5-260
5-269 through 5-272	5-269 through 5-272
5-273 and 5-274	5-273 and 5-274
5-277 and 5-278	5-277 and 5-278
---	5-282.1 through 5-282.8
5-310.1 and 5-310.2	5-310.1 and 5-310.2
5-405 and 5-406	5-405 and 5-406
5-417 thorough 5-422	5-417 through 5-422
5-493 and 5-494	5-493 and 5-494
5-494.5 and 5-494.6	5-494.5 and 5-494.6
5-494.11 through 5-494.16	5-494.11 through 5-494.16
5-494.19 and 5-494.20	5-494.19 and 5-494.20

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Remove pages	Insert pages
i through iv	i through iv
5-31 and 5-32	5-31 and 5-32
5-35 and 5-36	5-35 and 5-36
5-69 through 5-74	5-69 through 5-74
5-86.1 through 5-86.4	5-86.1 through 5-86.4
5-95 and 5-96	5-95 and 5-96
5-97 through 5-100	5-97 through 5-100
5-113 through 5-126	5-113 through 5-126
5-139 through 5-142	5-139 through 5-142
5-142.1 and 5-142.2	5-142.1 and 5-142.2
5-143 and 5-144	5-143 and 5-144
5-153 and 5-154	5-153 and 5-154
5-170.3 through 5-170.8	5-170.3 through 5-170.8
5-177 and 5-178	5-177 and 5-178
---	5-178.1/(5-178.2 Blank)
5-179 and 5-180	5-179 and 5-180
5-211 and 5-212	5-211 and 5-212
5-227 and 5-228	5-227 and 5-228
5-293 and 5-294	5-293 and 5-294
5-306.4.3/(5-306.4.4 Blank)	5-306.4.3/(5-306.4.4 Blank)
---	5-306.17/(5-306.18 Blank)
5-309 and 5-310	5-309 and 5-310
5-315 through 5-318	5-315 through 5-318
5-326.1 and 5-326.2	5-326.1 and 5-326.2
5-343 and 5-344	5-343 and 5-344
5-372.1 and 5-372.2	5-372.1 and 5-372.2
5-375 and 5-376	5-375 and 5-376
5-411 and 5-412	5-411 and 5-412

Remove pages	Insert pages
5-423 and 5-424	5-423 and 5-424
---	5-432.1/(5-432.2 Blank)
5-435 through 5-440	5-435 through 5-440
---	5-440.1 through 5-440.4
5-445 through 5-450	5-445 through 5-450
---	5-450.1 through 5-450.4
5-499 and 5-500	5-499 and 5-500
---	5-500.1/(5-500.2 Blank)
5-501 through 5-504	5-501 through 5-504
5-507 and 5-508	5-507 and 5-508
---	5-508.1/5-508.2 Blank)
5-509 and 5-510	5-509 and 5-510
---	5-526.1 through 5-526.30

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CH-47D HELICOPTER

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Remove pages	Insert pages
5-215 and 5-216	5-215 and 5-216
5-223 and 5-224	5-223 and 5-224
5-343 through 5-346	5-343 through 5-346
5-372.1 and 5-372.2	5-372.1 and 5-372.2
---	5-372.2.1/5-372.2.2

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CH-47D HELICOPTER

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NO. 15

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Remove pages	Insert pages
5-55 and 5-56	5-55 and 5-56
5-345 and 5-346	5-345 and 5-346
- - -	5-346.1/5-346.2
5-467 and 5-468	5-467 and 5-468
5-471 and 5-472	5-471 and 5-472
5-495 and 5-496	5-495 and 5-496

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Remove pages	Insert pages
g/h	g/h
5-17 and 5-18	5-17 and 5-18
5-23 through 5-28	5-23 through 5-28
---	5-32.1 through 5-32.3/ 5-32.4
5-37 through 5-40	5-37 through 5-40
---	5-40.1/5-40.2
5-41 through 5-44	5-41 through 5-44
5-47 through 5-54	5-47 through 5-54
5-57 and 5-58	5-57 and 5-58
5-58.1 through 5-58.4	5-58.1 through 5-58.5/ 5-58.6
5-67 through 5-86	5-67 through 5-86
5-86.3 through 5-86.5/5-86.6	5-86.3 through 5-86.5/ 5-86.6
5-87 through 5-94	5-87 through 5-94
---	5-94.1 through 5-94.7/ 5-94.8
5-95 and 5-96	5-95 and 5-96
---	5-96.1 through 5-96.3/ 5-96.4
5-97 through 5-104	5-97 through 5-104
5-121 through 5-132	5-121 through 5-132
5-135 and 5-136	5-135 and 5-136
5-141 and 5-142	5-141 and 5-142
---	5-142.1 and 5-142.2
5-151 and 5-152	5-151 and 5-152
---	5-152.1/5-152.2
5-153 and 5-154	5-153 and 5-154
5-154.1/5-154.2	5-154.1/5-154.2
5-155 through 5-166	5-155 through 5-166
5-169 and 5-170	5-169 and 5-170
---	5-170.1 through 5-170.13/ 5-170.14
5-171 through 5-174	5-171 through 5-174
---	5-174.1/5-174.2
5-175 through 5-180	5-175 through 5-180

Remove pages	Insert pages
---	5-180.1/5-180.2
5-181 through 5-198	5-181 through 5-198
5-203 through 5-210	5-203 through 5-210
---	5-214.1 through 5-214.6
5-215 through 5-222	5-215 through 5-222
5-225 through 5-228	5-225 through 5-228
---	5-228.1/5-228.2
5-229 through 5-232	5-229 through 5-232
---	5-232.1/5-232.2
5-233 and 5-234	5-233 and 5-234
5-234.1 through 5-234.6	5-234.1 through 5-234.6
---	5-234.6.1/5-234.6.2
5-234.7 through 5-234.14	5-234.7 through 5-234.14
---	5-234.15 through 5-234.17/ 5-234.18
---	5-234.19 through 5-234.22
5-235 and 5-236	5-235 and 5-236
5-236.1 and 5-236.2	5-236.1 and 5-236.2
---	5-236.2.1/5-236.2.2
5-236.3 through 5-236.19/ 5-236.20	5-236.3 through 5-236.19/ 5-236.20
5-237 through 5-258	5-237 through 5-258
5-258.1 through 5-258.10	5-258.1 through 5-258.9/ 5-258.10
5-259 through 5-290	5-259 through 5-290
--	5-290.1 through 5-290.3/ 5-290.4
5-291 and 5-292	5-291 and 5-292
---	5-292.1 through 5-292.9/ 5-292.10
5-293 through 5-296	5-293 through 5-296
5-296.1 through 5-296.4	5-296.1 through 5-296.3/ 5-296.4
5-297 through 5-306	5-297 through 5-306
5-306.1 through 5-306.4	5-306.1 through 5-306.4
---	5-306.4.1 through 5-306.4.3/ 5-306.4.4
5-306.5 and 5-306.6	5-306.5 and 5-306.6
5-306.6.1 and 5-306.6.2	5-306.6.1 and 5-306.6.2
5-306.7 through 5-306.12	5-306.7 through 5-306.12
---	5-306.12.1 through 5-306.12.7/5-306.12.8
5-306.13 and 5-306.14	5-306.13 and 5-306.14
---	5-306.15 and 5-306.16
5-310.17 and 5-310.18	5-310.17 and 5-310.18
5-311 through 5-320	5-311 through 5-319/5-320
5-325 and 5-326	5-325 and 5-326
5-326.1 through 5-326.4	5-326.1 through 5-326.4
5-327 and 5-328	5-327 and 5-328
5-328.1 through 5-328.4	5-328.1 through 5-328.4
5-329 and 5-330	5-329 and 5-330
---	5-330.1 through 5-330.6
5-343 and 5-344	5-343 and 5-344
5-347/5-348	5-347/5-348
5-353 and 5-354	5-353 and 5-354

Remove pages	Insert pages
---	5-354.1 through 5-354.3/ 5-354.4
5-355 through 5-358	5-355 through 5-358
---	5-358.1 through 5-358.5/ 5-358.6
5-359 and 5-360	5-359 and 5-360
5-362.1 and 5-362.2	5-362.1 and 5-362.2
5-363 and 5-364	5-363 and 5-364
5-371 and 5-372	5-371 and 5-372
---	5-372.3 through 5-372.5/ 5-372.6
5-383 and 5-384	5-383 and 5-384
5-387 through 5-398	5-387 through 5-398
5-405 through 5-408	5-405 through 5-408
5-411 through 5-416	5-411 through 5-416
---	5-416.1 through 5-416.6
5-433 and 5-434	5-433 and 5-434
5-453 and 5-454	5-453 and 5-454
5-483 through 5-488	5-483 through 5-488
5-494.21/5-494.22	5-494.21/5-494.22
5-501 and 5-502	5-501 and 5-502
5-507 through 5-510	5-507 through 5-510
5-513 through 5-516	5-513 through 5-516
5-521 through 5-526	5-521 through 5-526
5-531 through 5-540	5-531 through 5-540

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C 13

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Aviation Unit and Aviation Intermediate Maintenance Manual

CH-47D HELICOPTER

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CH-47D HELICOPTER

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5-317 and 5-318	5-317 and 5-318

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CH-47D HELICOPTER

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Remove pages	Insert pages
5-493 and 5-494	5-493 and 5-494
----	5-494.1 through 5-494.21/5-494.22

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Remove pages	Insert pages
5-306.6.1 through 5-306.6.4	5-306.6.1 through 5-306.6.4
5-311 and 5-312	5-311 and 5-312
5-317 and 5-318	5-317 and 5-318

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To be distributed in accordance with DA Form 12-31, AVUM and AVIM Maintenance requirements for CH-47D Helicopter, Cargo Transport.

URGENT

WARNING AND FIRST AID DATA.

For artificial respiration and other first aid data, refer to FM 21-11.

Personnel performing instructions involving operations, procedures, and practices which are included or implied in this technical manual shall observe the following instructions. Disregard of these warnings and precautionary information can cause serious injury, illness, death, or an aborted mission.

WARNING

An operating procedure, practice, etc., which if not correctly followed, could result in personal injury or loss of life.

CAUTION

An operation procedure, practice, etc., which if not strictly observed, could result in damage to or destruction of equipment.

NOTE

An operating procedure, condition, etc., which is essential to highlight.

WARNING

Cleaning Solvents

- **Those areas of skin and clothing that come in contact with cleaning solvents should be thoroughly washed immediately.**
- **Saturated clothing should be removed immediately.**
- **Areas in which cleaning solvents are used should be adequately ventilated to keep vapors to a minimum.**
- **If cleaning solvents contact the eyes, nose, or ears, flush them with generous quantities of water, and then seek medical attention immediately.**

WARNING

Electrical and Electronic Equipment Maintenance

- **Do not wear rings, watches, or metal jewelry when working around electrical equipment. Serious burns can result.**
- **Be careful when working on 150- and 300-volt dc circuits and on ac generator 115- and 200-volt ac outputs. Serious burns can result.**

WARNING

Dangerous Static Charges

Ground the helicopter during parking, fueling, or defueling. Sparks can cause fuel vapor to ignite.

WARNING

Dangerous Voltages at Antenna Terminals

Be careful when working near antenna or antenna terminals. Radio frequency (rf) voltages exist at these points when transmitters are operating. Contact with radiating antennas can cause serious rf burns.

WARNING

Poisonous Carbon Monoxide Fumes

Toxic carbon monoxide fumes may be present inside the helicopter whenever engines or apu are operating with cargo ramp open. Ventilate the cockpit.

WARNING

Corrosive Battery Electrolyte (Potassium Hydroxide)

- The electrolyte used in nickel-cadmium batteries contains potassium hydroxide which is a caustic substance.
- Contact with skin or eyes will cause burns.
- Use rubber gloves, rubber apron, and protective eye covering or face shield when handling battery.
- If personal contact with electrolyte occurs, flush immediately with large amounts of only clean water. Get medical attention immediately.

WARNING

Explosive Battery Hazard

- Before removing or installing battery, make sure battery switch is OFF and battery has cooled down if overheated.
- Connecting or disconnecting battery connector while battery is under load may cause explosion or electrical arcing resulting in injury to personnel.

WARNING

Electrolyte Contamination

- Separate nickel-cadmium batteries and lead-acid type batteries as far as possible from each other.
- Do not let anything associated with a lead-acid battery, including air, come in contact with a nickel-cadmium battery or its electrolyte. Sulfuric acid fumes from a lead-acid battery could result in damage to a nickel-cadmium battery leading to battery failure and a hazard to personnel.
- Do not use same tools or protective clothing for both types of batteries.
- If sulfuric acid has been somehow mixed with electrolyte in the battery, the upper areas of the battery cells will appear green in color indicating battery failure or damage and potential danger to personnel unless replaced.

WARNING

Acids and Alkalines

- Do not add water to acid. A violent action will result. Add acid to water in small quantities.
- Rust stripper is an alkaline solution.
- Avoid skin contact. Wear protective clothing. Wash thoroughly after using.

WARNING

Windshield Rain Repellent

- Do not let windshield rain repellent contact open flame. Deadly hydrogen fluoride gas could be generated.
- Wash hands with soap and water after handling repellent.

WARNING

Antiseize Compounds

- Some antiseize compounds are irritants. Avoid inhaling fumes and contact with skin.
- Wear protective clothing. Wash thoroughly after using.

WARNING

Paints, Varnishes, Dopes, Thinners, and Lubricants

- These materials are generally highly flammable and may be irritants. Work in a well-ventilated area away from open flames.
- Avoid inhaling fumes and prolonged contact with skin. Wash thoroughly after using.

WARNING

Epoxy Resins, Cements, and Adhesives

- These materials may contain toxic or irritating substances. They may also be flammable. Work in a well-ventilated area away from open flames.
- Wear protective clothing. Avoid contact with skin. Wash thoroughly after using.

WARNING

Radiation Hazard

- Some instruments contain radioactive material. Do not try to disassemble these instruments. They present no radiation hazard unless seal is broken.
- If you think seal is broken, do not remove instrument from helicopter before consulting Base Radioactive Protection Officer (AR 40-15).
- Use a beta-gamma radiac meter AN/PDR-27 or equivalent to determine if instrument contains radioactive material (radium).

WARNING

Fire Extinguishing Agents

- Monobromotrifluoromethane (CF_3Br) is highly volatile but is not easily detected by smell. It is not toxic, but reduces oxygen available for proper breathing.
- If liquid CF_3Br contacts skin, it can cause frostbite or low temperature burns.
- If agent touches eyes or skin, immediately flush affected area with running water. Get medical attention.

WARNING

Noise

- Sound pressure levels in this helicopter during some operating conditions exceed the Surgeon General's hearing conservation criteria (TB MED251).
- Hearing protection devices, such as aviator helmet or ear plugs, shall be worn by all personnel in and around the helicopter during operation.

WARNING

FOD

- Make sure area is clear of foreign objects before closing access doors, panels, and fairings.
- If area is not clear, damage to components or systems could result in personal injury or death.

WARNING

JP-4/JP-5 Fuel
MIL-T-5624

- Fuel is flammable. Do not use near welding areas, open flames, or on very hot surfaces.
- Use only with adequate ventilation.
- Avoid prolonged or repeated contact with skin. Prolonged contact may cause drying and irritation of skin.
- Remove saturated clothing immediately.
- Do not smoke when handling fuel.
- Do not take internally.
- Store in approved, metal safety containers.

WARNING

Lubricating Oils
MIL-L-23699 or MIL-L-7808

- If oil is decomposed by heat, toxic gases are released.
- Prolonged contact with liquid or mist may cause dermatitis and irritation.
- If there is prolonged contact with skin, wash affected area with soap and water. If oil contacts eyes, flush with water immediately. Remove saturated clothing.
- If swallowed, do not try to vomit. Seek immediate medical attention.
- When handling liquid oil, wear rubber gloves. If prolonged contact with mist is likely, wear approved respirator.

WARNING

Lifting Components With Hoist

- Lifting or hoisting of components shall only be done by designated personnel.
- The load capacity rating shall be clearly marked on hoist. Do not exceed load rating.
- Inspection and testing for cracks or defects in hoist system shall be performed on a regular basis.
- Before lifting, alert personnel in immediate areas.
- Before lifting, balance the load.
- Do not stand under load while it is being moved from one area to another on a hoist.
- Do not stand under load to do maintenance work.

WARNING

Hydraulic Pressures

- High pressures used in testing hydraulic components can cause line rupture or component failure.
- Only qualified personnel shall operate, service, and maintain hydraulic test equipment.
- Use heavy plastic shielding at least 1/2-inch thick when applying pressures over 250 psi to prevent injury to personnel.

WARNING

Hydraulic Fluid

- Hydraulic fluid is toxic. It can irritate skin and eyes and cause burns. When fluid is decomposed by heating, it releases toxic gases.
- Avoid inhaling. Use only with adequate ventilation. If prolonged contact with mist is likely, wear an appropriate respirator.
- Avoid contact with skin, eyes, or clothing. Wear rubber gloves if handling liquid.
- In case of contact with skin, immediately wash skin with soap and water. In case of contact with eyes, flush them immediately with clear water and get medical attention.
- If liquid is swallowed, do not induce vomiting; get immediate medical attention.

WARNING

Compressed Air

- Do not use more than 30 psi compressed air for cleaning purposes. Debris propelled under pressure can cause injury to eyes.
- Use eye protection to prevent injury to personnel.

WARNING

Flare Dispenser

- Flares can accidentally fire, sometimes from stray voltage. Injury or death can result.
- Remove all electrical power from helicopter before installing loaded payload module on dispenser assembly.
- Keep hands and face away from end of payload module during installation.

WARNING

Maintenance Platforms/Workstands

- Use only appropriate maintenance platforms/workstands illustrated in TM 55-405-10, or other approved locally procured stands and restraint equipment, when working above 10 feet on helicopters in a nontactical environment. Otherwise, personnel injury could result from accidental falls.

WARNING

- Do not wear eyeglasses having light sensitive lenses while performing magnetic particle (black light) or fluorescent penetrant inspections.
- Such lenses have a 16 to 45 percent light transmission loss.
- Wearing them can result in failure to detect flaws and cracks under ultraviolet light.

WARNING

Cadmium-Plated Tools

- **Use only chrome-plated or unplated steel tools when working on the helicopter.**
- **Cadmium or zinc-plated tools are not permitted, since these platings are prone to chipping and flaking. The chips and flakes could cause corrosion or fluid contamination.**
- **All tools, regardless of plating type, shall be serviceable and free of chipping.**

TECHNICAL MANUAL
No. 55-1520-240-23

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *10 May 1983*

Aviation Unit and Aviation Intermediate Maintenance Manual CH-47D HELICOPTER

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to Commander, U.S. Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MPSD, 4300 Goodfellow Boulevard, St. Louis, Missouri, 63120. A reply will be furnished to you.

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CHAPTER 5

ROTOR SYSTEM

SECTION I

ROTARY-WING HEAD AND CONTROLS

DESCRIPTION AND OPERATION

5-1 ROTARY-WING HEAD AND CONTROLS 5-1

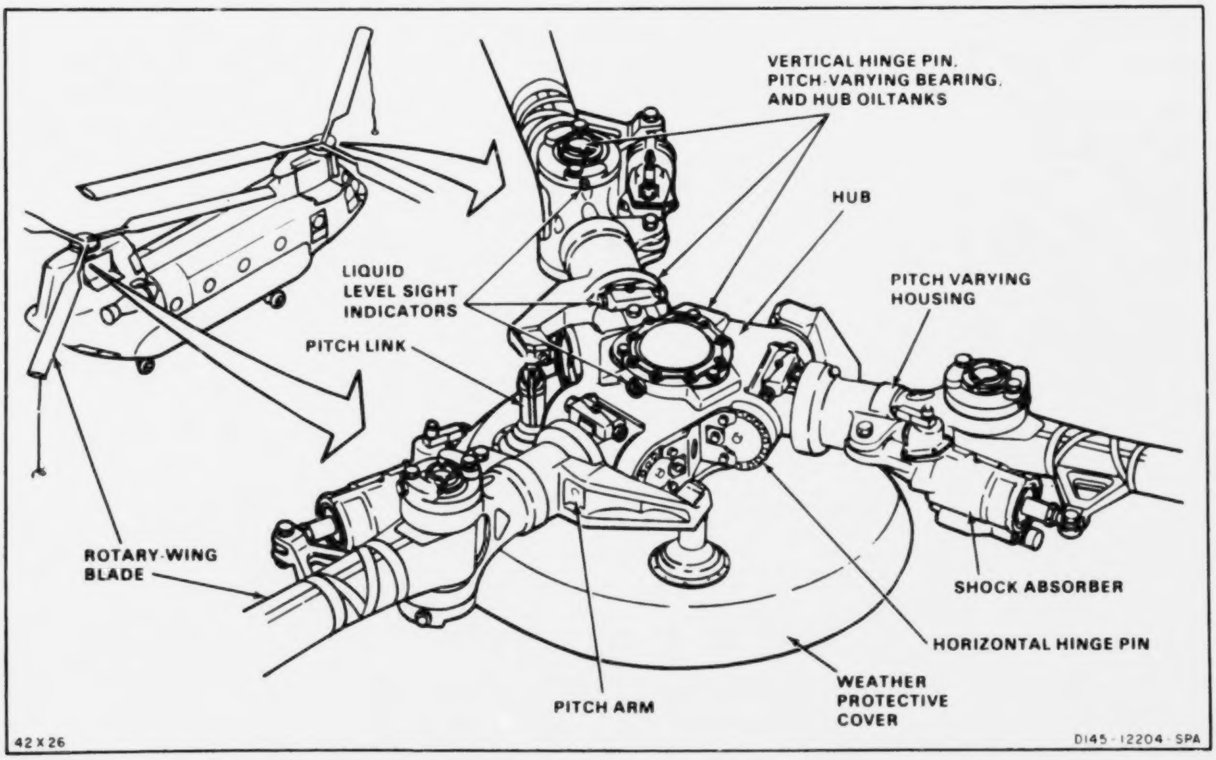
This rotary-wing head transmits torque from the forward or aft transmission rotor shafts to the rotary-wing blades. The rotary-wing controls transmit cockpit control movements to the blades. Three rotary-wing blades are attached to both the forward and aft rotary-wing heads. The aft blades turn clockwise and the forward blades turn counterclockwise, when viewed from above. Each rotary-wing head and controls consists of a rotor hub, three pitch-varying housings, three pitch-varying shafts with droop stops, three shock absorbers, a swashplate, three pitch links, a drive collar and drive arms, and a weather-protective cover.

ROTOR HUB

The rotor hub contains splines that mate with splines on the transmission rotor shaft. Pitch shafts are connected to the hub through the three horizontal pins. These pins ride in bearings supported by the hub lugs. Caps retaining the pins and bearings are secured by locking beams. The beams connect the leading cap of one pin with the trailing cap of the next pin.

PITCH-VARYING HOUSINGS

The pitch-varying housings are connected internally to pitch-varying shafts by flexible, laminated steel tie bars. The laminated tie bar allows the pitch housing to rotate on the pitch shaft to change blade pitch. The tie bar is connected to the inboard end of the pitch shaft. The pitch arm on each housing is connected by a pitch link to a lug on the swashplate. The pitch link raises or lowers the pitch arm to rotate the housing on two roller bearings on the shaft. Outboard lugs on the housing contain bearings for the vertical hinge pin.


VERTICAL HINGE PIN, PITCH-VARYING BEARING, AND HUB OILTANKS
HUB
LIQUID LEVEL SIGHT INDICATORS
PITCH VARYING HOUSING
PITCH LINK
ROTARY-WING BLADE
SHOCK ABSORBER
HORIZONTAL HINGE PIN
WEATHER PROTECTIVE COVER
PITCH ARM
42 X 26
D145-12204-SPA

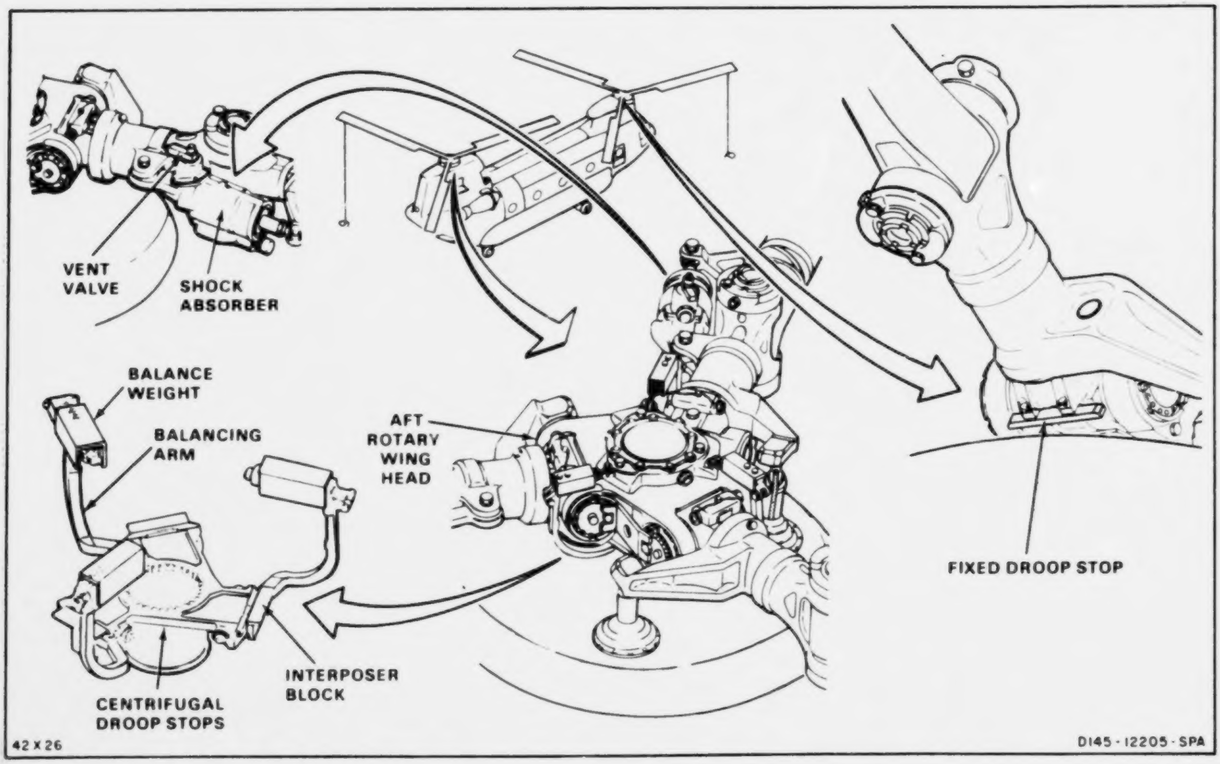
GO TO NEXT PAGE

DROOP STOPS

The droop stops limit blade droop. Each pitch-varying housing is supported by a droop stop. Forward and aft heads have fixed droop stops. These are installed on the bottom of the pitch shaft to limit droop at zero rotor speed. These fixed droop stops rest directly against the hub. The centrifugal droop stop assembly is mounted on a splined plate under the aft rotor head. The droop stop contains three balancing arms. These are connected by springs to lugs on the hub oil tank. Interposer blocks on the balancing arms are positioned between fixed blocks and the hub. As rotor speed increases, the centrifugal droop stops swing out. This moves interposer blocks clear of the pitch shafts and allows more freedom for blade droop. As rotor speed decreases, the springs pull the arms in toward the hub. This positions the blocks between the hub and pitch shafts to reduce droop angle.

SHOCK ABSORBERS

Each head has three shock absorbers. They are connected between lugs on the pitch-varying housing and brackets on the blades. The shock absorbers limit lead and lag motion of the blades. Each shock absorber has a vent valve. The valve is opened for extreme cold weather operation. Changing the vent valve position allows the shock absorber to be used on forward or aft head.


VENT VALVE
SHOCK ABSORBER
BALANCE WEIGHT
BALANCING ARM
AFT ROTARY WING HEAD
FIXED DROOP STOP
INTERPOSER BLOCK
CENTRIFUGAL DROOP STOPS
42 X 26
D145-12205-SPA

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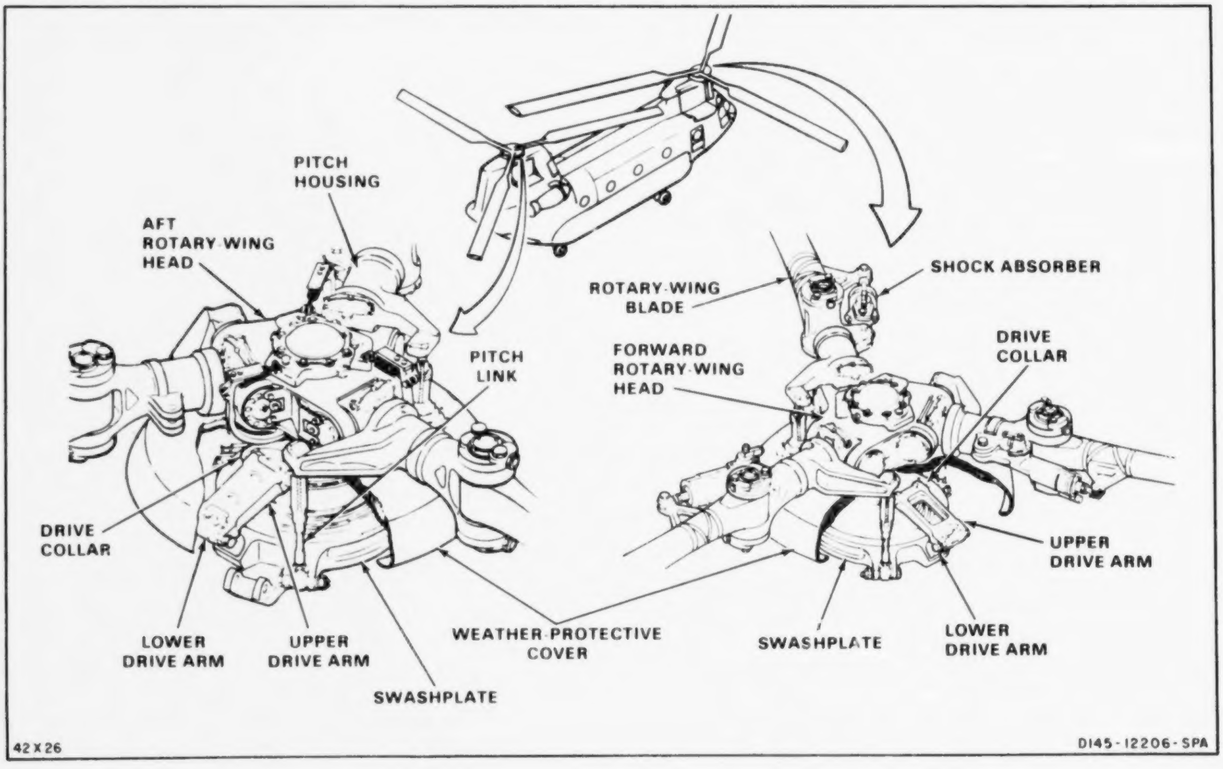
SWASHPLATES

The forward and aft swashplates transmit manual or automatic cockpit control movements to the rotary-wing blades. The swashplates can be tilted and moved vertically. This movement is transferred to the blades through the pitch links and pitch-varying housings. Forward and aft swashplates have aluminum rotating rings. The stationary ring on the aft swashplate is steel. On the forward swashplate this ring is aluminum. The stationary ring of each swashplate is mounted on a spherical bearing. This allows the swashplate to tilt in any direction. A ball bearing connects rotating and stationary rings. The swashplate is free to slide up or down on a slider shaft to change blade pitch angle. Lugs are provided on the rotating ring for connecting three pitch links and an upper drive arm. Drive arm lugs are located in two positions so the rotating ring can be used on forward or aft swashplate. Lugs on the stationary ring provide for connection of two servocylinders, fixed link, and logitudinal cyclic trim actuator. Two single interruptors and a double interruptor on the rotating ring, and a magnetic pickup on the stationary ring, are used for rotor balancing.

PITCH LINKS

The six pitch links are connected between the swashplates and pitch-varying housings. Tilting a swashplate up or down moves the pitch link and pitch arm in the same direction. This increases or decreases the blade pitch angle. Raising or lowering the swashplate on the slider shaft changes pitch on all three blades.


PITCH HOUSING
AFT ROTARY WING HEAD
PITCH LINK
ROTARY-WING BLADE
SHOCK ABSORBER
FORWARD ROTARY-WING HEAD
DRIVE COLLAR
DRIVE COLLAR
UPPER DRIVE ARM
LOWER DRIVE ARM
UPPER DRIVE ARM
WEATHER-PROTECTIVE COVER
SWASHPLATE
LOWER DRIVE ARM
SWASHPLATE
42 X 26
D145-12206-SPA

GO TO NEXT PAGE

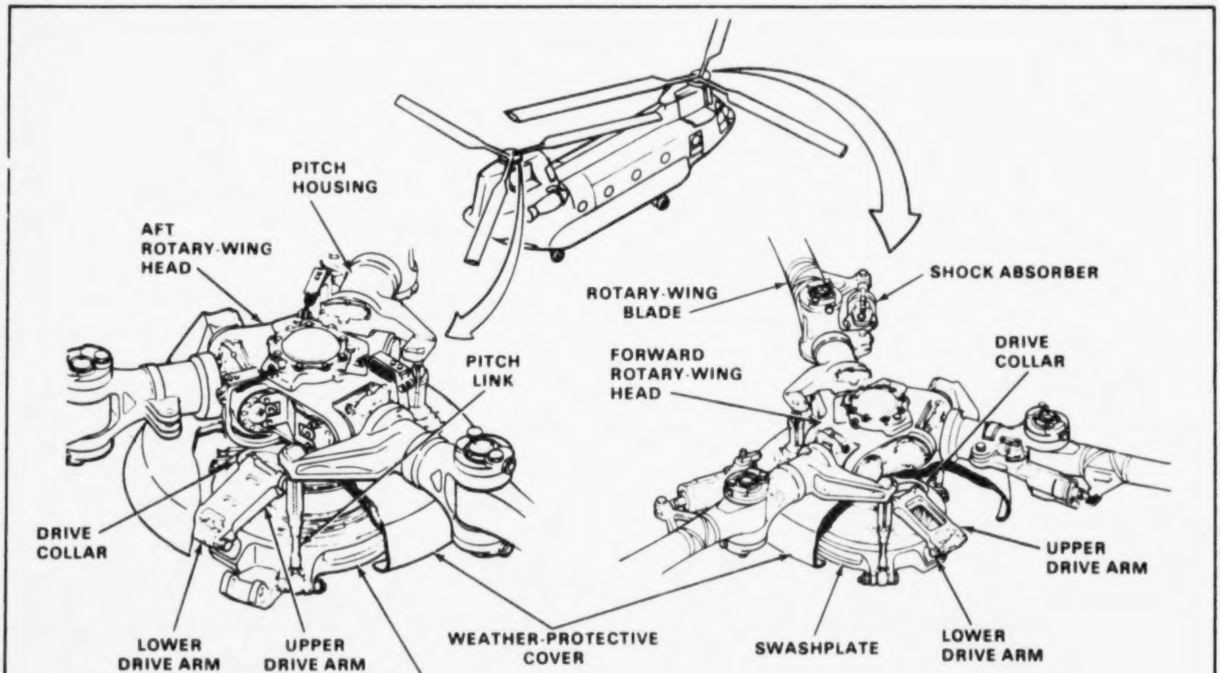
Three pitch links are installed on each rotary-wing head. Forward and aft pitch links are similar except for the angle between rod ends. Each pitch link is adjustable to change the pitch of an individual blade. Moving the turnbuckle toward the + mark makes the pitch link longer and increases blade pitch. A turn in the – direction shortens the pitch link and decreases blade pitch.

DRIVE COLLAR AND DRIVE ARMS

The drive collar transmits torque to the swashplate through the upper and lower drive arms. The drive arms are hinged to allow the swashplate to slide up and down on the slider shaft. The splined drive collars mate with splines on the transmission rotor shafts. A flange is located on the drive collar for installation of the weather-protective cover. Drive collar lugs are provided for connecting the upper drive arm. The upper drive arm is connected at the other end to the lower drive arm. Both connections are hinged. A ball spherical bearing on the lower drive arm is connected to the swashplate. This arrangement allows swashplate to tilt.

WEATHER-PROTECTIVE COVER

The weather-protective cover is bolted to the drive collar flange and turns with the collar and shaft. The cover provides weather-protection for the upper controls. Flexible boots protect the upper portion of the pitch links where they pass through the cover.


PITCH HOUSING
AFT ROTARY-WING HEAD
PITCH LINK
DRIVE COLLAR
LOWER DRIVE ARM
UPPER DRIVE ARM
SWASHPLATE
WEATHER-PROTECTIVE COVER
ROTARY-WING BLADE
SHOCK ABSORBER
FORWARD ROTARY-WING HEAD
DRIVE COLLAR
UPPER DRIVE ARM
SWASHPLATE
LOWER DRIVE ARM
42X26
D145-12207-SPA

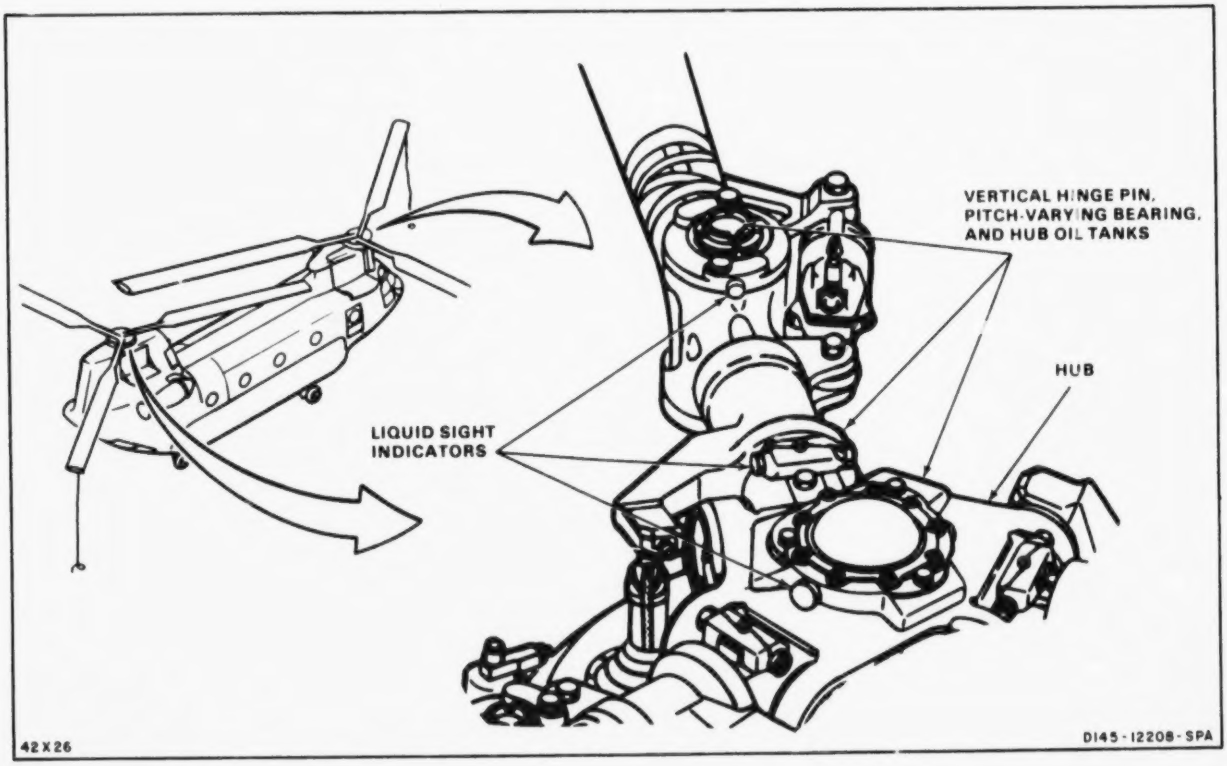
GO TO NEXT PAGE

LUBRICATION SYSTEM

A single hub oil tank lubricates the horizontal pin bearings. Each pitch-varying housing has a pitch bearing oil tank and two vertical pin bearing oil tanks. The vertical pin tanks are connected to each other by an oil manifold tube. Sight indicators are provided for each tank, to check oil level. The swashplate is lubricated with grease.

SELF-RETAINING BOLTS

Bolts connecting upper controls and shock absorbers are the positive-retention or impedance types. These bolts have a pawl or lock ring to keep the bolt in place, even with the nut removed. Bolts are installed with bolt heads facing the direction of rotation (Task 1-14).


VERTICAL HINGE PIN, PITCH-VARYING BEARING, AND HUB OIL TANKS
HUB
LIQUID SIGHT INDICATORS
42X26
D145-12208-SPA

END OF TASK

SECTION II

ROTARY-WING HEAD AND CONTROLS

5-2 PREPARE ROTARY-WING HEADS FOR SHIPMENT OR STORAGE 5-2

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Rotor Head Lifting Device (T30)
Rotary-Wing Head Shipping Container (T73)
Hoist
Low Pressure Air Supply

Materials:

Lubricating Oil (E254)
Solvent (E162)
Cloths (E120)
Corrosion-Preventive Compound (E153)
Desiccant (E160) (Six 16 Unit Bags)
Barrier Material (E80)
Foam (E181)
Tape (E395)
Boxes (E82)
Gloves (E186)

Personnel Required:

Medium Helicopter Repairer (2)

Equipment Condition:

Rotary-Wing Head Mounted on Handling Adapter (T13) (Task 5-3)
Vertical Hinge Pin and Nuts Removed from Head (Task 5-64)

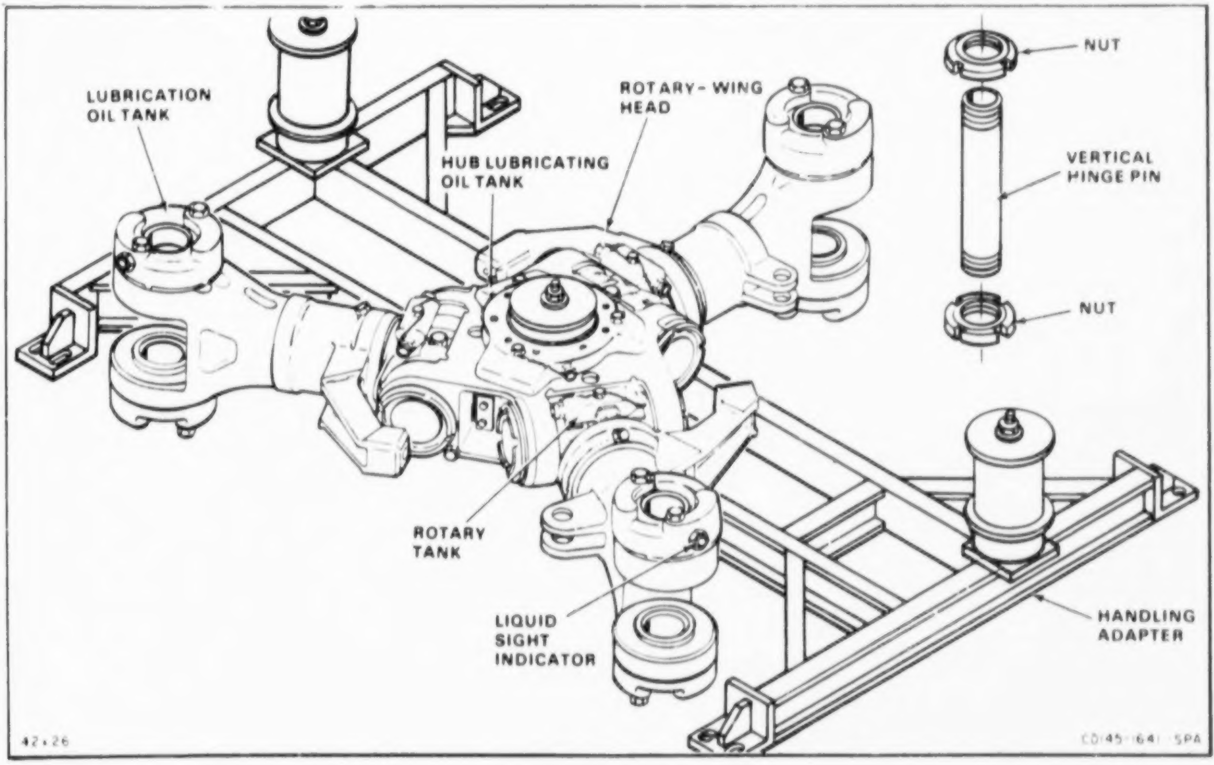
General Safety Instructions:

WARNING

Solvent (E162) and corrosion-preventive compound (E153) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Be careful when releasing air under pressure; wear goggles. Personal injury can result.


LUBRICATION OIL TANK
ROTARY-WING HEAD
HUB LUBRICATING OIL TANK
NUT
VERTICAL HINGE PIN
NUT
ROTARY TANK
LIQUID SIGHT INDICATOR
HANDLING ADAPTER
42x26

GO TO NEXT PAGE

5-2 PREPARE ROTARY-WING HEADS FOR SHIPMENT OR STORAGE (Continued) 5-2

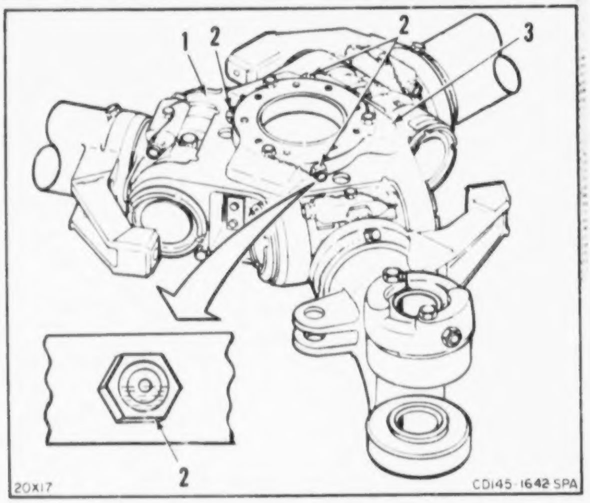
WARNING

- **Oil (E254) is a skin irritant. If oil gets on skin, wash thoroughly. If oil soaks into cloths, change clothes immediately.**
- **Oil (E254) gives off fumes that can cause injury to personnel. Use oil in a well-ventilated area.**

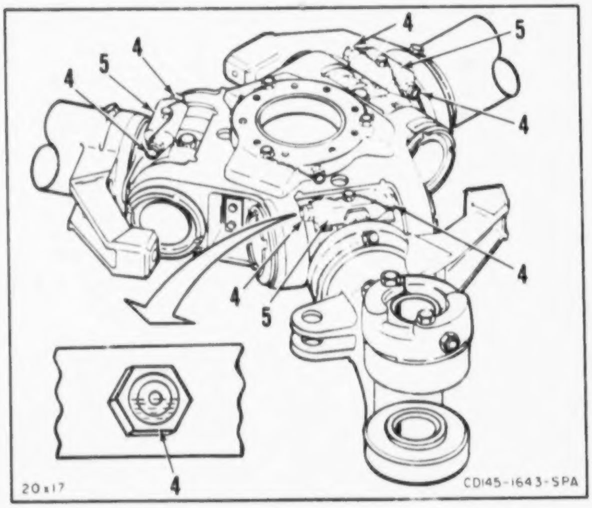
GO TO NEXT PAGE

5-2 PREPARE ROTARY-WING HEADS FOR SHIPMENT OR STORAGE (Continued) 5-2

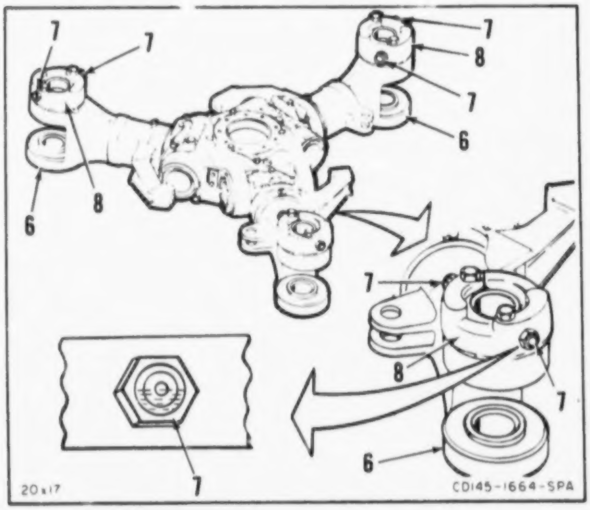
1. Check that head (1) is level.
2. **Check oil level** in any of three indicators (2) **on tank (3).** Oil level shall be up to center of indicator.


1
2
2
3
2
20X17
CD145-1642 SPA

3. **Check oil level** in indicators (4) of three **tanks (5).** Oil level shall be up to center of indicator.


4
5
4
5
4
5
4
4
4
5
4
20x17
CD145-1643-SPA

4. Check that housings (6) are level.
5. **Check oil level** in indicators (7) of **three tanks (8).** Oil level shall be up to center of indicator.


7
7
7
8
7
6
8
6
7
8
7
6
7
20x17
CD145-1664-SPA

GO TO NEXT PAGE

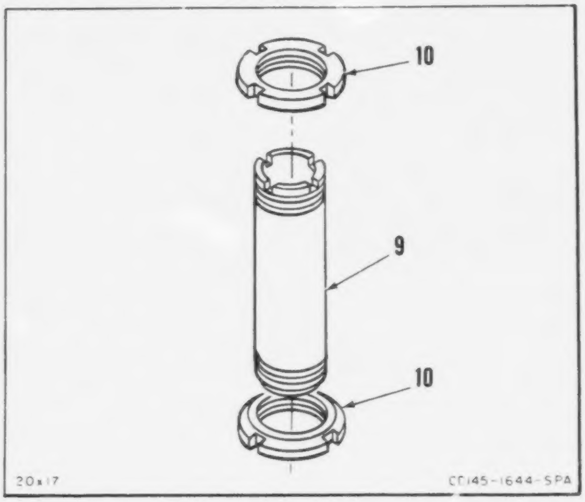
5-2 PREPARE ROTARY-WING HEADS FOR SHIPMENT OR STORAGE (Continued) 5-2

6. Clean three vertical hinge pins (9) and six nuts (10). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
7. Apply thin coat of corrosion-preventive compound (E153) to pins (9) and nuts (10). Wear gloves (E186).

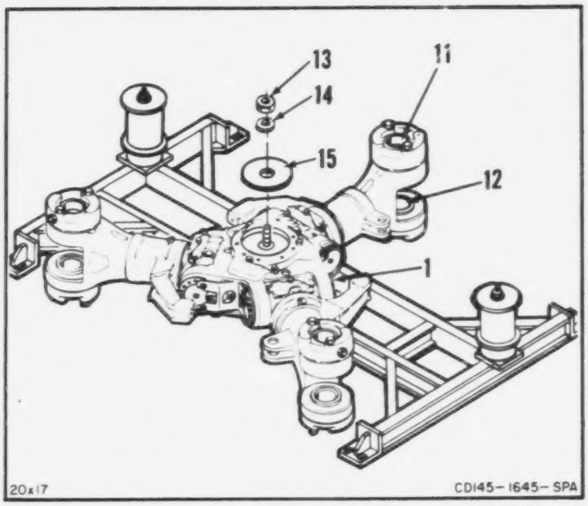
CAUTION

Wrap each pin and each nut separately to prevent scratching of pins.

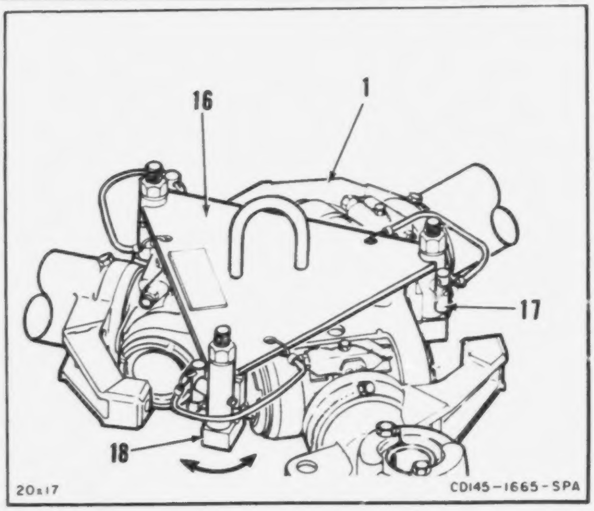
8. Wrap three pins (9) and six nuts (10) in barrier material (E80).



9. Clean outside parts of head (1) and inner bearing races (11 and 12). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
10. Apply coat of corrosion-preventive compound (E162) to races (11 and 12). Wear gloves (E186).
11. Remove nut (13), washer (14), and plate (15).



12. **Install lifting device (T30) (16)** on head (1) as follows:
    a. Remove three pins (17) and turn support arms (18) outward.
    b. Position lifting device (16) on head (1).
    c. Turn arms (18) inward under head (1). Install pins (17).



GO TO NEXT PAGE

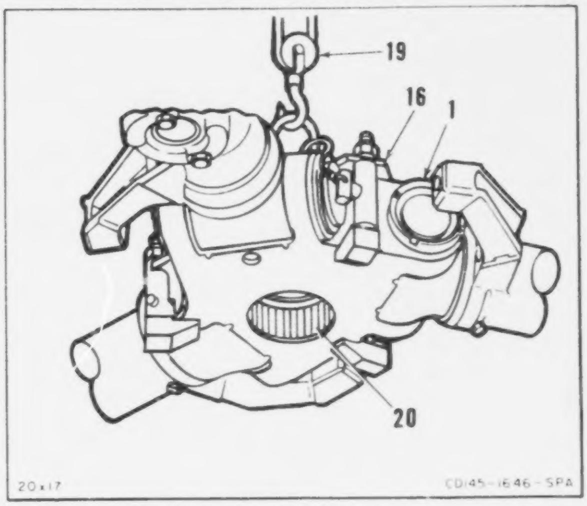
5-2 PREPARE ROTARY-WING HEADS FOR SHIPMENT OR STORAGE (Continued) 5-2

WARNING

Head is heavy and can injure personnel if it drops. Head must be supported by hoist and moved carefully to prevent injury to personnel.

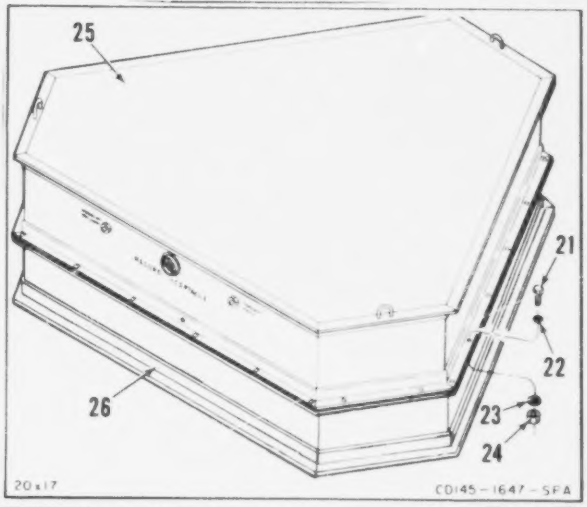
13. Lift head (1). Use mobile hoist device (19). Clean splines (20). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).

14. Coat splines (20) with corrosion-preventive compound (E153).


19
16
1
20
20x17
CD145-1646-SPA

15. Remove 24 bolts (21), washers (22), lockwashers (23), and nuts (24). **Remove cover (25).**

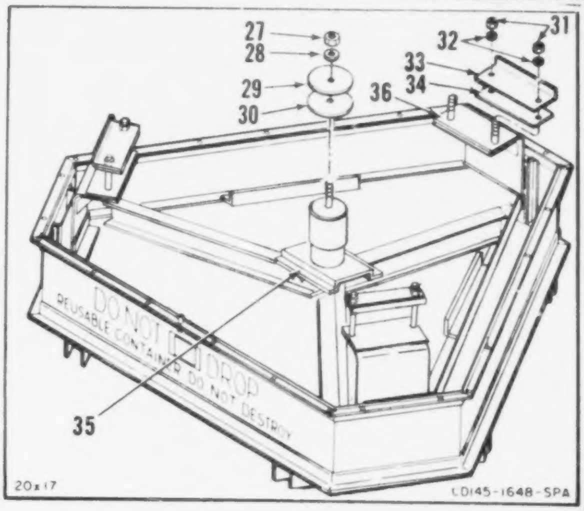
16. Check that container (26) is clean and dry. Remove any dirt or moisture.


25
21
22
26
23
24
20x17
CD145-1647-SPA

17. Remove nut (27), washer (28), clamp plate (29), and upper hub cushion (30).

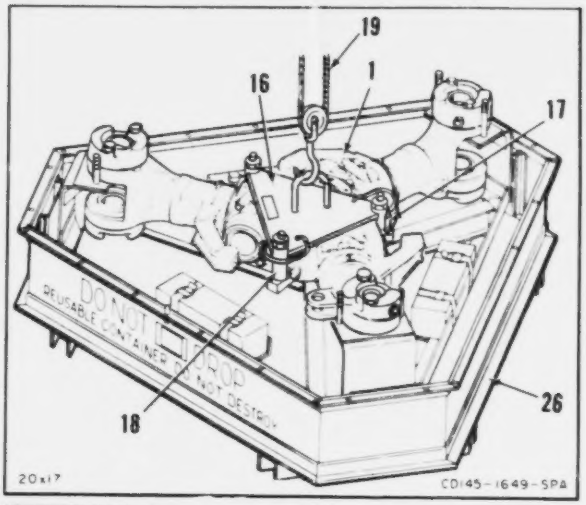
18. Remove six nuts (31) and washers (32) from three clamp angles (33). Remove angles and upper lug cushions (34).

19. Check that lower hub cushion (35) and three lug cushions (36) are in place.


27
28
29
30
31
32
33
34
36
35
DO NOT DROP
REUSABLE CONTAINER DO NOT DESTROY
20x17
CD145-1648-SPA

GO TO NEXT PAGE

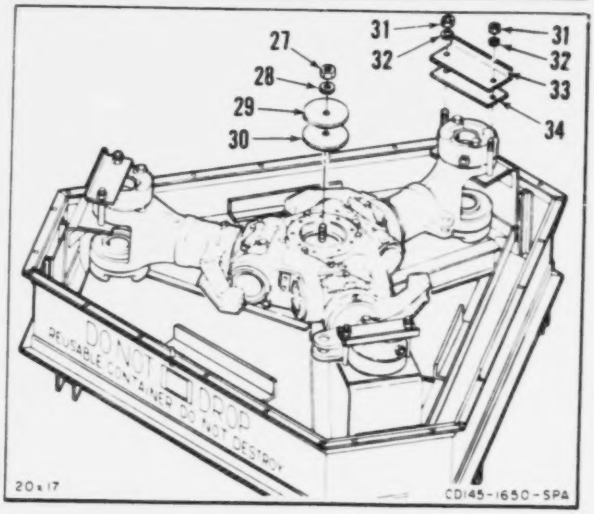
5-2 PREPARE ROTARY-WING HEADS FOR SHIPMENT OR STORAGE (Continued) 5-2


19
16
1
17
DO NOT DROP
REUSABLE CONTAINER DO NOT DESTROY
26
18
20x17
CD145-1649-SPA

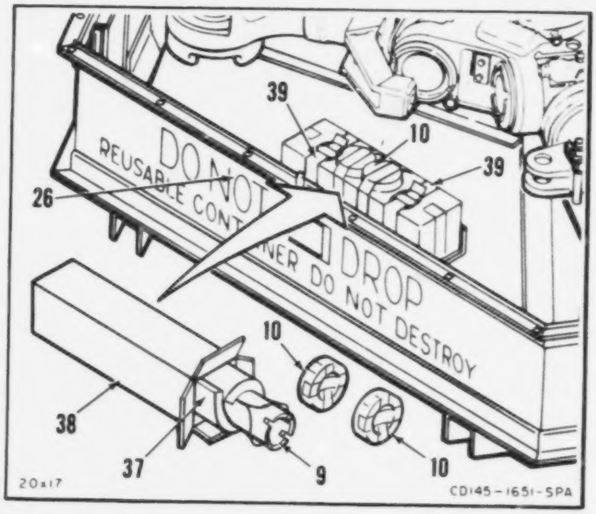
CAUTION

Head can be easily damaged. Move head slowly and carefully to prevent it from hitting container.

20. **Position head (1) in container (T73) (26).** Use lifting device (T30) (16) and hoist (19). Have helper guide head.
21. Remove three pins (17). Turn three support arms (18) outward. Remove lifting device (16).


27
28
29
30
31
32
31
32
33
34
DO NOT DROP
REUSABLE CONTAINER DO NOT DESTROY
20x17
CD145-1650-SPA

22. **Install cushion (30), plate (29), washer (28), and nut (27).**
23. **Install three cushions (34) and clamp angles (33).** Secure with six washers (32) and nuts (31). Tighten nuts just enough to compress cushions.


39
10
39
26
DO NOT DROP
REUSABLE CONTAINER DO NOT DESTROY
10
38
37
9
10
20x17
CD145-1651-SPA

24. Wrap each of three pins (9) with foam (E181) (37).

NOTE

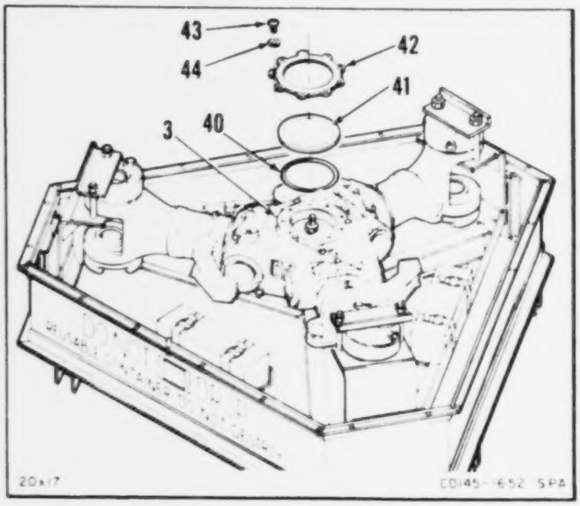
Pack only one pin in each box.

25. **Pack three pins (9) in three boxes** (E82) **(38).** Seal boxes with tape. **Tape two nuts (10) on top of each box.** Use tape (E395).
26. Position three boxes (38) in container (T73) (26). **Secure boxes with straps (39).**

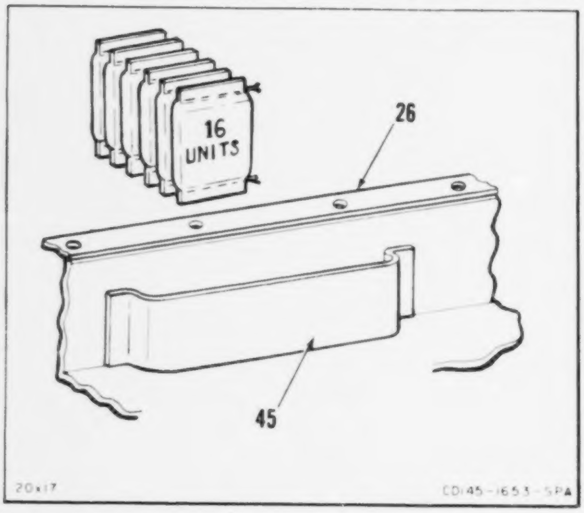
GO TO NEXT PAGE

5-2 PREPARE ROTARY-WING HEADS FOR SHIPMENT OR STORAGE (Continued) 5-2

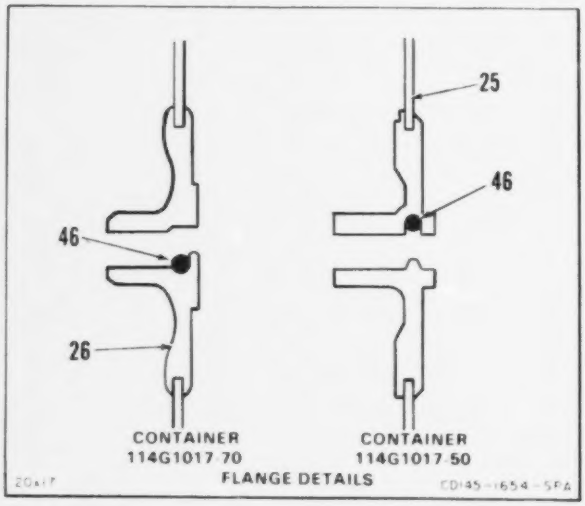
27. **Install packing (40), cover (41), and retainer (42) on tank (3).** Secure with nine screws (43), and washers (44).


43
44
42
41
3
40
20x17
CD145-1652-SPA

28. **Put six 16 unit bags of desiccant (E160) in basket (45)** inside container (26).


16
UNITS
26
45
20x17
CD145-1653-SPA

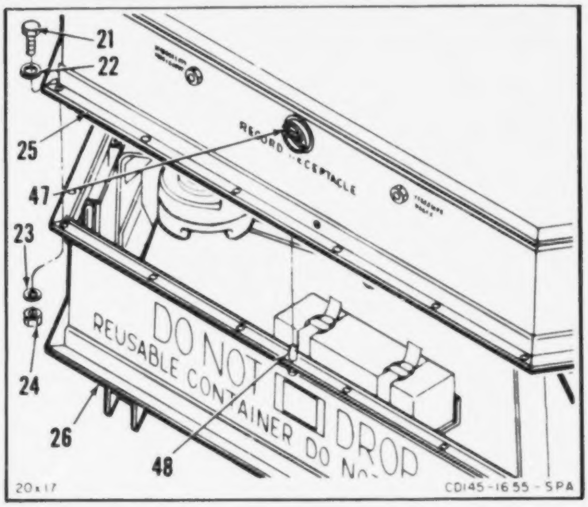
29. On container (114G1017-70), **check that gasket (46) is seated** on flange of container (26). On container (114G1017-50), **check that gasket (43) is seated** on flange of cover (25). Check gasket for cracks, nicks, or tears.


25
46
46
26
CONTAINER
114G1017-70
CONTAINER
114G1017-50
FLANGE DETAILS
20x17
CD145-1654-SPA

GO TO NEXT PAGE

5-2 PREPARE ROTARY-WING HEADS FOR SHIPMENT OR STORAGE (Continued) 5-2

30. Align record receptacle (47) with locator pin (48). **Install cover (25)** on container (26). Install 24 bolts (21), washers (22), lockwashers (23), and nuts (24). Tighten every fifth bolt until all are tight.


21
22
25
47
23
24
26
48
RECORD RECEPTACLE
DO NOT DROP
REUSABLE CONTAINER DO NO
20x17
CD145-1655-SPA

31. **Remove plug (49)** from cover (25).
32. **Connect air test line (50)** to cover (25).

CAUTION

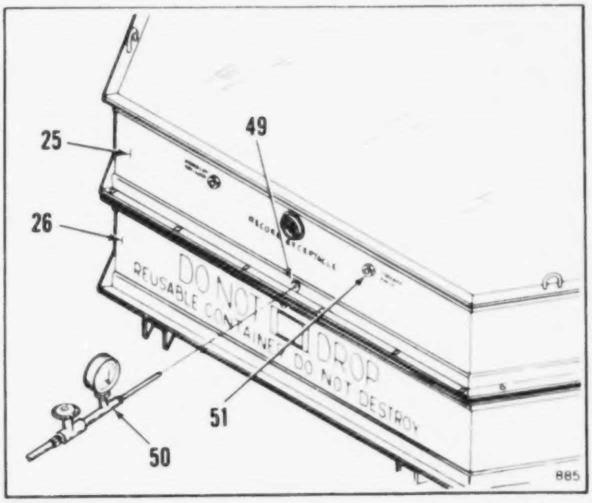
Low pressure air supply must be used. Exceeding test pressure can damage container.

33. **Pressurize container (26)** to **3 psi max.** Check container for leaks. Container must hold **3 psi** for 1 hour.

WARNING

Be careful when releasing air under pressure; wear goggles. Personal injury can result.

34. **Push pressure relief valve (51)** until pressure in container (26) is **0 psi.**
35. **Disconnect air line (50)** from cover (25).
36. **Install plug (49)** in cover (25).


25
49
26
51
50
RECORD RECEPTACLE
DO NOT DROP
REUSABLE CONTAINER DO NOT DESTROY
885

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-3 REMOVE ROTARY-WING HEAD FROM SHIPPING CONTAINER 5-3

INITIAL SETUP

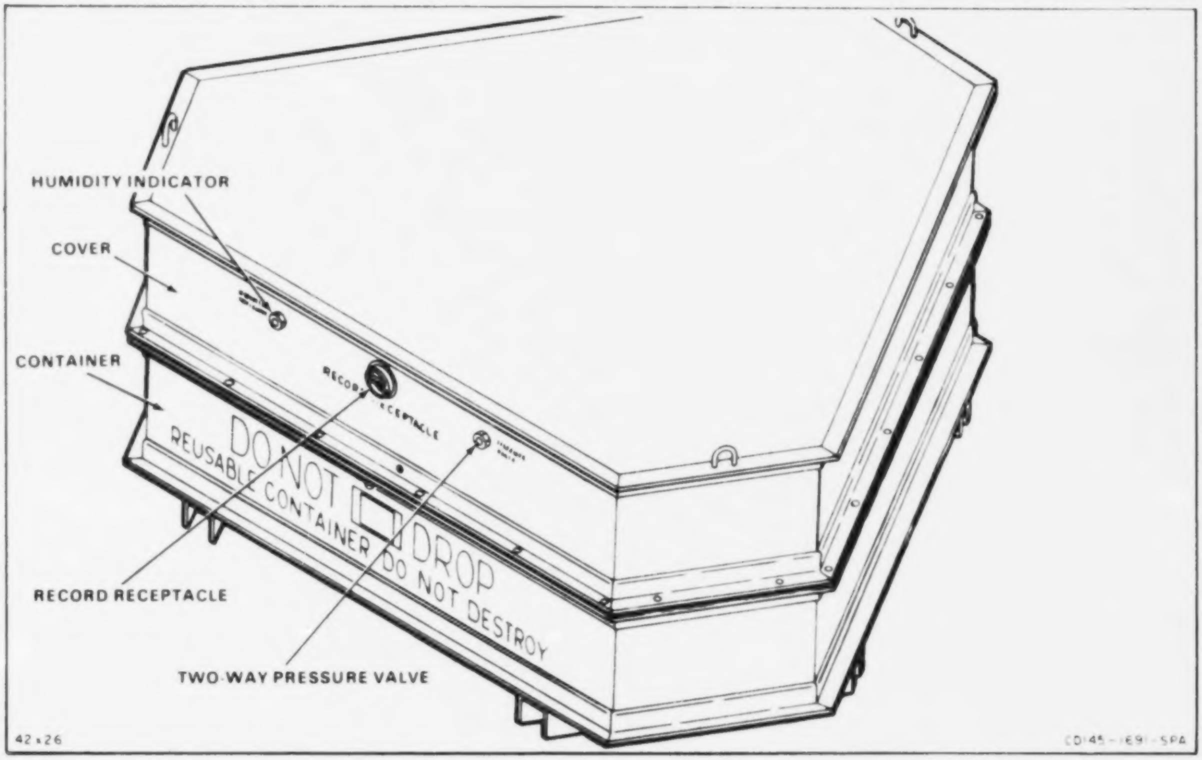
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Rotor Head Lifting Device (T30)
Handling Adapter (T13)

Materials:
None

Personnel Required:
67U10 Medium Helicopter Repairer
67U20 Medium Helicopter Repairer

Equipment Condition:
Rotary-Wing Head Installed in Container (T73) (Task 5-2)


HUMIDITY INDICATOR
COVER
CONTAINER
RECORD RECEPTACLE
TWO-WAY PRESSURE VALVE
DO NOT DROP
REUSABLE CONTAINER DO NOT DESTROY
42x26
CD145-1691-SPA

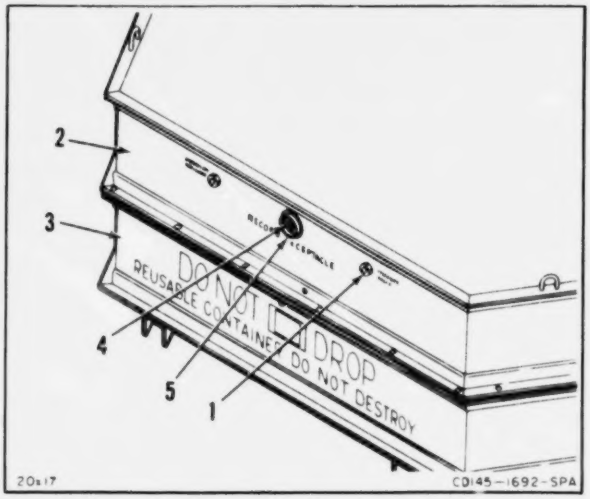
GO TO NEXT PAGE

5-3 REMOVE ROTARY-WING HEAD FROM SHIPPING CONTAINER (Continued) 5-3

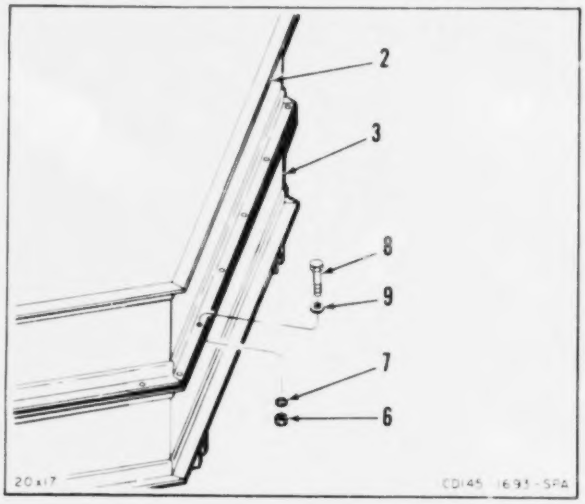
WARNING

Be careful when releasing air under pressure; wear goggles. Personal injury can result.

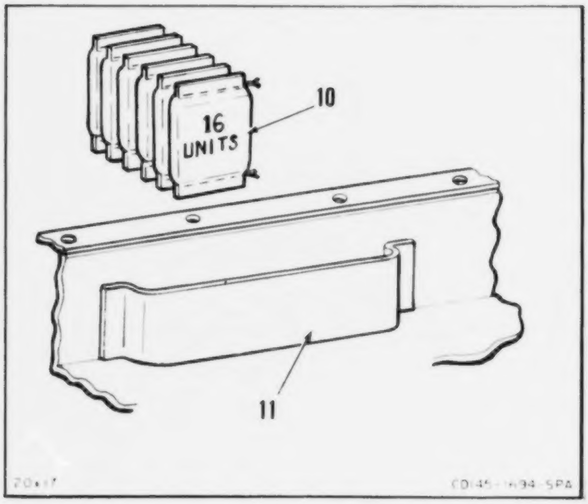
1. **Press air valve (1)** in cover (2) of container (3).
2. Turn cap (4) counterclockwise. **Remove** rotary-wing head **log** from receptacle (5).


2
3
4
5
1
DO NOT DROP
REUSABLE CONTAINER DO NOT DESTROY
RECEPTACLE
20x17
CD145-1692-SPA

3. Remove 24 nuts (6), lockwashers (7), bolts (8), and washers (9) from flanges of container (3). **Remove cover (2).**


2
3
8
9
7
6
20x17
CD145-1693-SPA

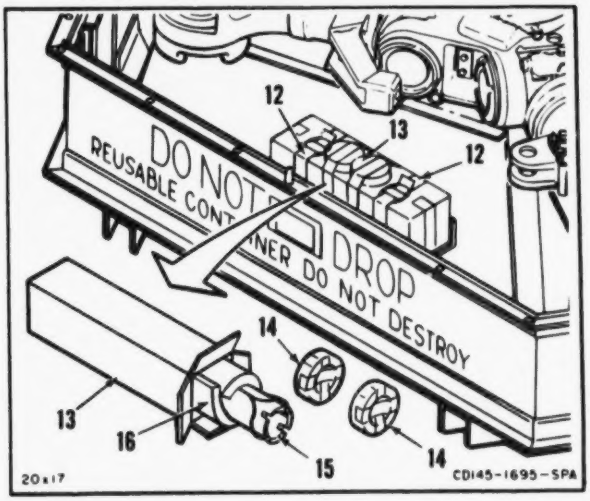
4. **Remove desiccant (10)** from basket (11).


10
16 UNITS
11
20x17
CD145-1694-SPA

GO TO NEXT PAGE

5-3 REMOVE ROTARY-WING HEAD FROM SHIPPING CONTAINER (Continued) 5-3

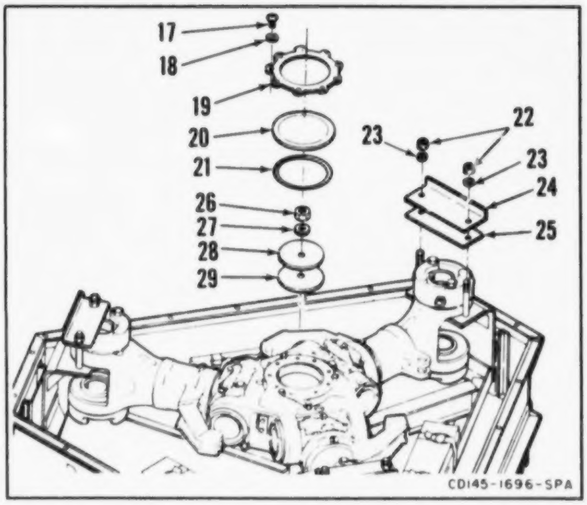
5. Open straps (12). Remove box (13). **Remove nuts (14).** Open box. **Remove pin (15)** and foam (16).


12
13
12
DO NOT DROP
REUSABLE CONTAINER DO NOT DESTROY
14
13
16
15
14
20x17
CD145-1695-SPA

GO TO NEXT PAGE

5-3 REMOVE ROTARY-WING HEAD FROM SHIPPING CONTAINER (Continued) 5-3

6. Remove nine screws (17) and washers (18) from retainer (19). **Remove retainer (19), cover (20), and packing (21).**
7. Remove six nuts (22) and washers (23) from three clamp angles (24). **Remove clamp angles and cushions (25).**
8. Remove nut (26) and washer (27) from clamp plate (28). **Remove clamp plate and cushion (29).**

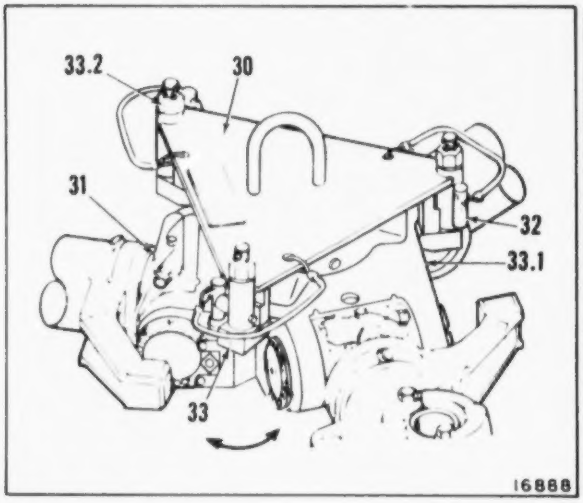

17
18
19
20
21
26
27
28
29
23
22
23
24
25
CD145-1696-SPA

9. **Install lifting device (T30) (30)** on rotor head (31) as follows:
   - a. Remove three pins (32). Rotate three arms (33) outward.
   - b. Position lifting device (30) on head (31).
   - c. Turn three arms (33) inward under top flange (33.1) of head (31). Make sure each arm points to the center of device (30) within 20 degrees. Make sure each arm engages flange at least 1/4 inch.
   - d. Install three pins (32).

CAUTION

Do not use wrench to tighten nuts. Lifting device (T30) can be damaged.

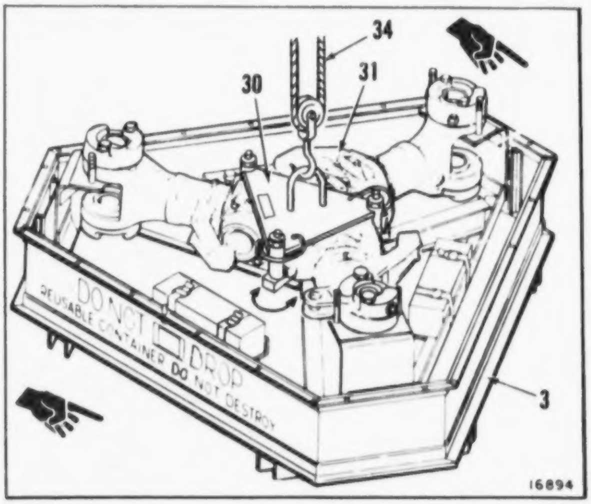
   - e. Hand-tighten three nuts (33.2).


33.2
30
31
32
33.1
33
16888

WARNING

Head is heavy and can injure personnel if it drops. Head must be supported by hoist and moved carefully to prevent injury to personnel.

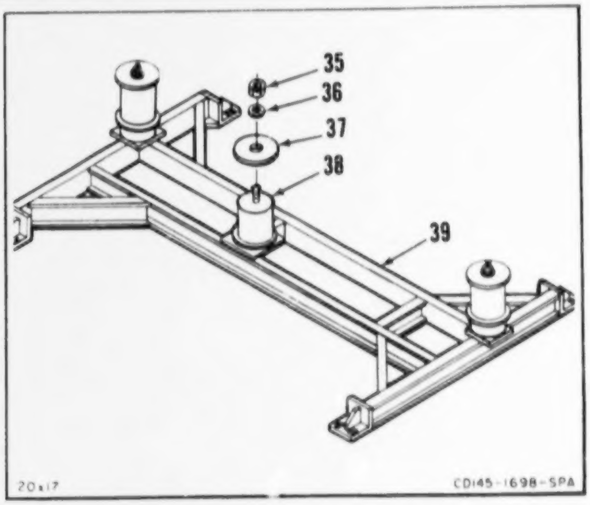
10. **Remove head (31)** from container (3). Use lifting device (T30) (30) and mobile hoist device (34).


34
30
31
DO NOT DROP
REUSABLE CONTAINER DO NOT DESTROY
3
16894

GO TO NEXT PAGE

5-3 REMOVE ROTARY-WING HEAD FROM SHIPPING CONTAINER (Continued) 5-3

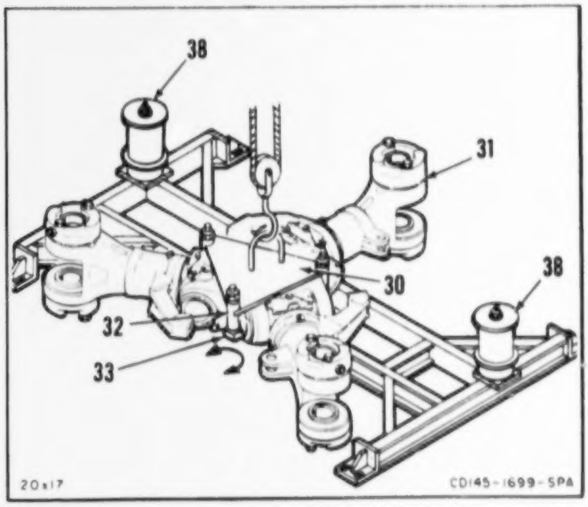
11. Remove nut (35), washer (36), and plate (37) from shaft (38) of handling adapter (T13) (39).


35
36
37
38
39
20x17
CD145-1698-SPA

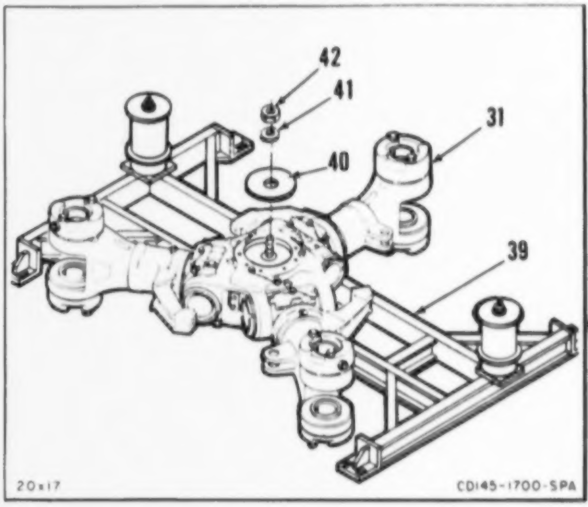
CAUTION

Head can be easily damaged. Move head slowly and carefully to prevent it from hitting handling adapter.

12. **Position head (31) on any one of three shafts (38).** Have helper guide head.
13. Remove three pins (32). Turn three arms (33) outward. **Remove lifting device (30).**


38
31
30
38
32
33
20x17
CD145-1699-SPA

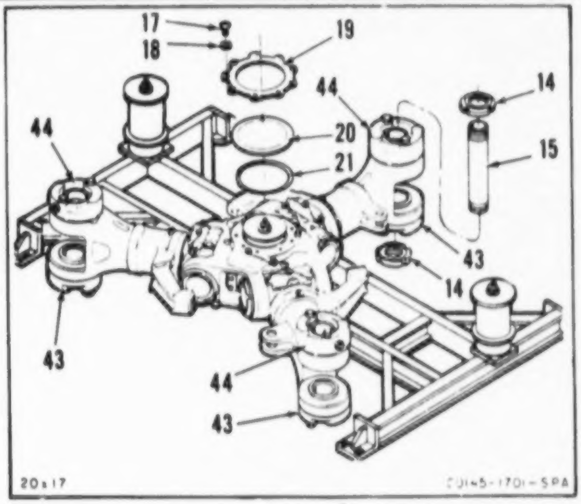
14. **Secure head (31)** to handling adapter (T13) (39) with plate (40), washer (41), and locknut (42).


42
41
31
40
39
20x17
CD145-1700-SPA

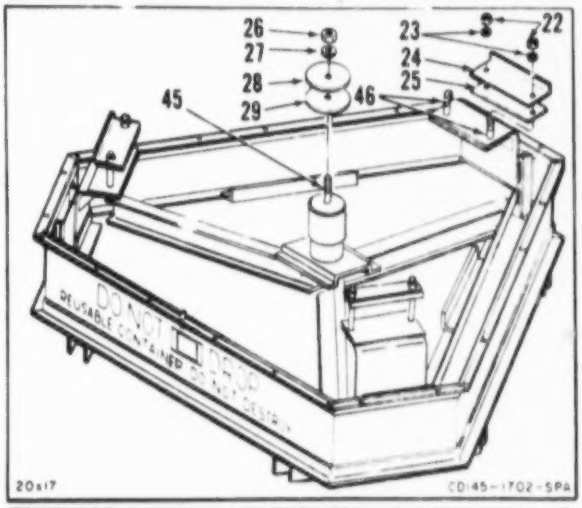
GO TO NEXT PAGE

5-3 REMOVE ROTARY-WING HEAD FROM SHIPPING CONTAINER (Continued) 5-3

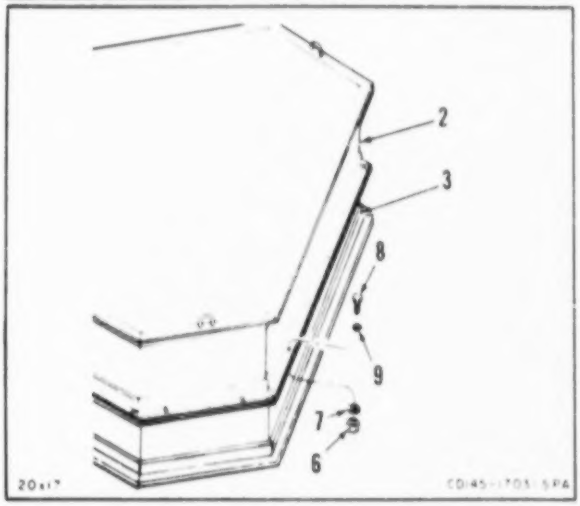
15. **Install** three **pins (15)** in lugs (43 and 44). **Install** six **nuts (14)** on pins and hand tighten.
16. **Install packing (21), cover (20), and retainer (19).**
17. Install nine screws (17) and washers (18).


17
18
19
44
14
44
20
21
15
43
14
14
43
44
43
20x17
CD145-1701-SPA

18. **Install cushion (29), clamp plate (28),** washer (27), and nut (26) on stud (45). Hand-tighten nut.
19. **Install three cushions (25) and clamp angles (24),** on studs (46). Install six washers (23) and nuts (22). Hand-tighten nuts.


26
27
28
29
45
23
22
24
25
46
DO NOT DROP
REUSABLE CONTAINER DO NOT DESTROY
20x17
CD145-1702-SPA

20. **Position cover (2) on container (3).** Secure with 24 washers (9), bolts (8), lockwashers (7), and nuts (6). Hand-tighten nuts.


2
3
8
9
7
6
20x17
CD145-1703-SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-4 PLACE ROTARY-WING HEAD IN SERVICE 5-4

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Rotor Head Lifting Device (T30)
Handling Adapter (T13)
Hoist
Rotor Head Workstand (T172)

Materials:

Dry Cleaning Solvent (E162)
Cloths (E120)
Lockwire (E231)
Gloves (E186)

Personnel Required:

Medium Helicopter Repairer (2)
Inspector

References:

Task 5-9
Task 1-55
Task 1-56
Task 1-57

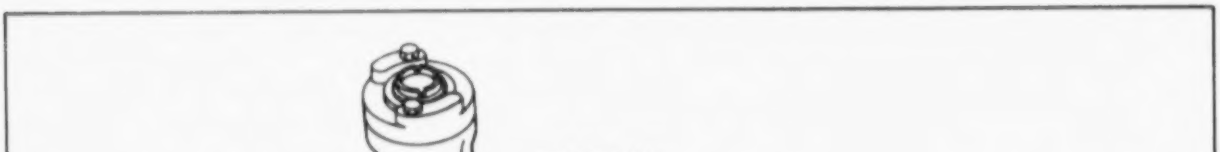
Equipment Condition:

Off Helicopter Task

General Safety Instructions:

WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

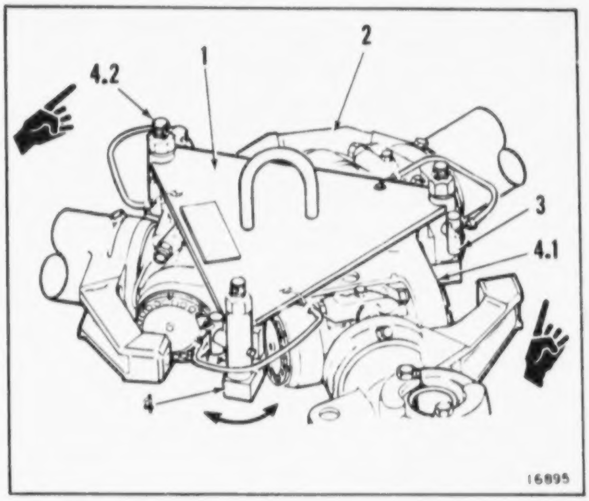

HUB OIL TANK
ROTARY-WING HEAD
ROTARY TANK
LUBRICATION OIL TANK
FILLER PLUG
DRAIN PLUG
LIQUID SIGHT INDICATOR
42x26
DH5-2243-SPA

GO TO NEXT PAGE

5-4 PLACE ROTARY-WING HEAD IN SERVICE (Continued) 5-4

NOTE

Procedure is same for forward and aft heads.



1. **Install lifting device (T30) (1)** on rotor head (2) as follows:
   a. Remove three pins (3). Turn support arms (4) outward.
   b. Position lifting device (1) on head (2).
   c. Turn three arms (4) inward under top flange (4.1) of head (2). Make sure each arm points to the center of device (1) within 20 degrees. Make sure each arm engages flange at least 1/4 inch.
   d. Install three pins (3).

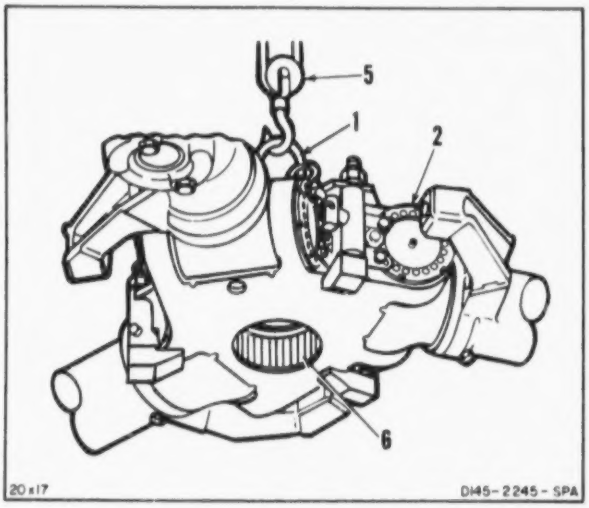
CAUTION

Do not use wrench to tighten nuts. Lifting device (T30) can be damaged.

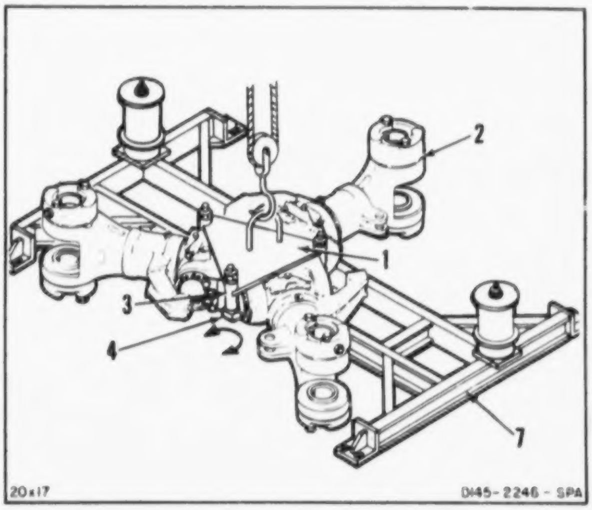
   e. Hand-tighten three nuts (4.2).

WARNING

Head is heavy and can injure personnel if it drops. Head must be supported by hoist and moved carefully to prevent injury.



2. Attach work hoist (5) to lifting device (T30) (1). **Lift head (2)** and **clean splines (6).** Use cloth (E120) damp with solvent (E162). Wear gloves (E186).



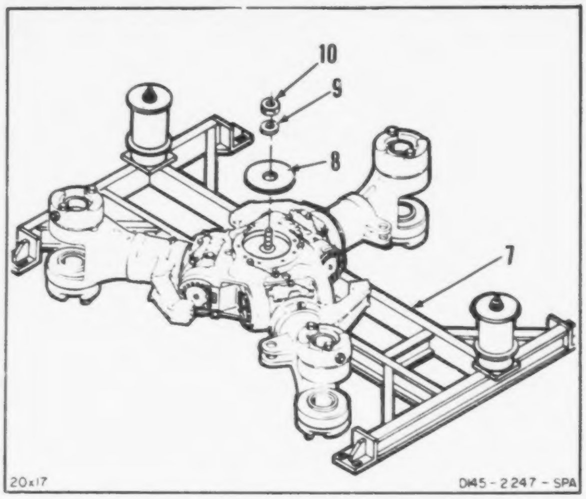
CAUTION

Move head slowly and carefully to prevent damage caused by head hitting handling adapter.

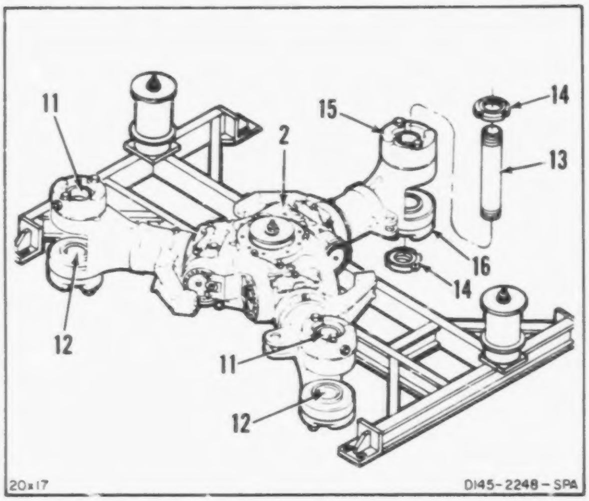
3. **Position head (2) on handling adapter (T13) (7).** Have helper guide head.
4. Check that head (2) is level.
5. **Remove lifting device (T30) (1)** as follows:
   a. Remove three pins (3) and turn arms (4) outward.
   b. Remove lifting device (1).

GO TO NEXT PAGE

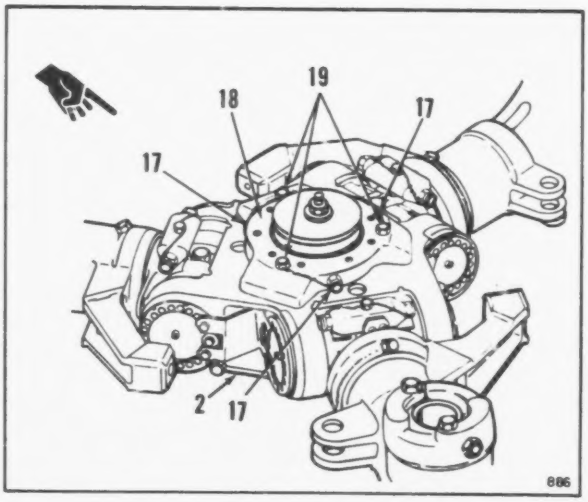
6. **Install plate (8),** washer (9), and locknut (10) on handling adapter (T13) (7).


10
9
8
7
20x17
DI45-2247-SPA

7. Clean outside parts of head (2) and inner bearing races (11 and 12). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
8. Clean three pins (13) and six nuts (14). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
9. **Install three pins (13)** in lugs (15 and 16). **Install six nuts (14)** on pins and hand tighten.


11
15
2
14
13
16
14
12
11
12
20x17
DI45-2248-SPA

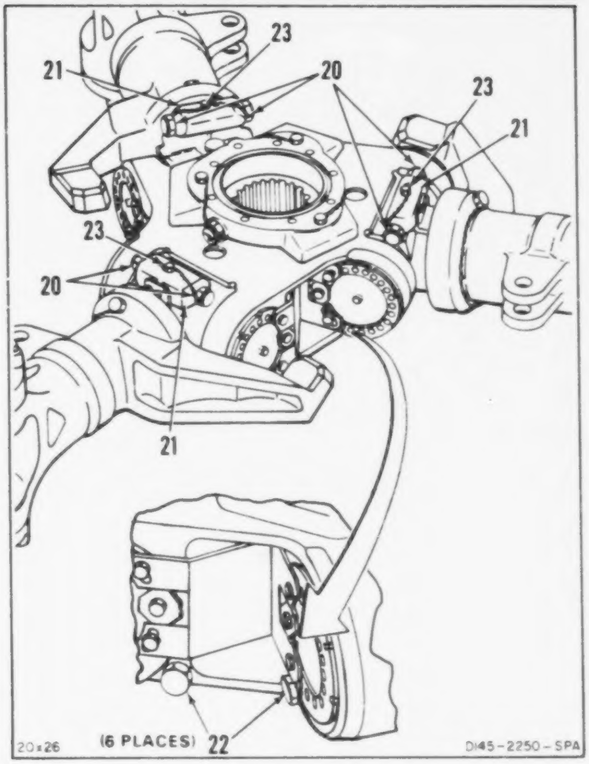
10. Check that head (2) is level.
11. **Check oil level in any of three indicators (17) on tank (18).** If oil level is not up to center of indicator, service tank (Task 1-56).
12. **Check that three plugs (19) and three indicators (17) are lockwired.**


19
18
17
17
2
17
886

GO TO NEXT PAGE

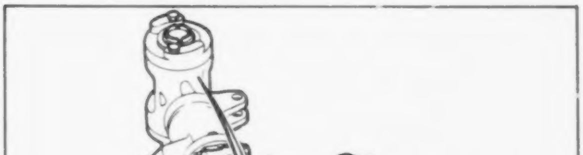
5-4 PLACE ROTARY-WING HEAD IN SERVICE (Continued) 5-4

13. **Check oil level in indicators (20) on three tanks (21).** If oil level is not up to center of indicator, service tank (Task 1-57).
14. **Check that six plugs (22), three plugs (23), and six indicators (20) are lockwired.**


23
21
20
23
21
23
20
21
20x26
(6 PLACES) 22
D145-2250-SPA

15. Check that three housings (24) are level.
16. **Check oil level in six indicators (25) on three tanks (26).** If oil level is not up to center of indicator, service tank (Task 1-57).
17. **Check that 12 indicators (25), six plugs (27), and 12 plugs (28) are lockwired.**

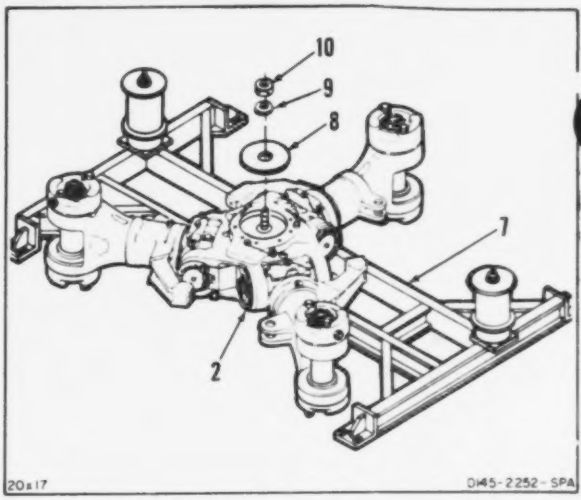
INSPECT


28
26
25
25
27
24
28
25
20x26
D145-2251-SPA

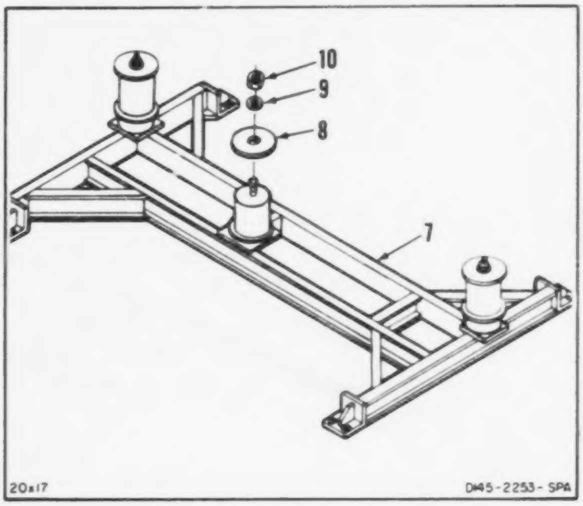
GO TO NEXT PAGE

5-4 PLACE ROTARY-WING HEAD IN SERVICE (Continued) 5-4

18. **Remove** nut (10), washer (9), and **plate (8)** from handling adapter (T13) (7).
19. **Install head (2) on helicopter** (Task 5-9).

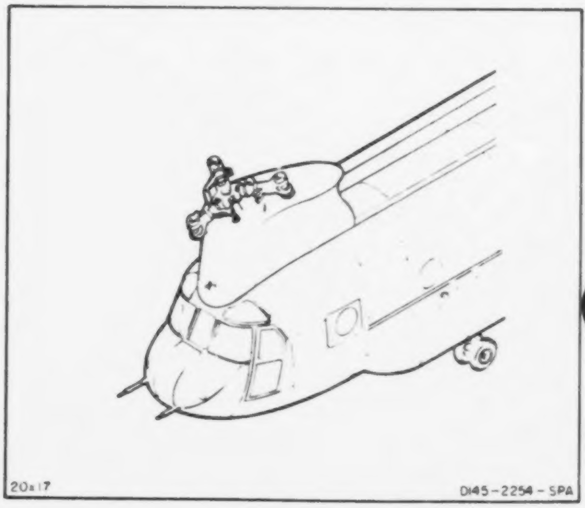

10
9
8
7
2
20x17
D145-2252-SPA

20. Install plate (8), washer (9), and nut (10) on handling adapter (T13) (7).


10
9
8
7
20x17
D145-2253-SPA

FOLLOW-ON MAINTENANCE:

None


20x17
D145-2254-SPA

END OF TASK

5-5 PRESSURE TEST ROTARY-WING HEAD SEALS AND PACKINGS 5-5

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Pump, Manual Inflating
Dial Indicating Pressure Gage, 0 to 30 Psi
Air Hose, 4 Feet Long (Appx E-4)
Stopwatch
Torque Wrench, 5 to 50 Inch-Pounds
Torque Wrench, 30 to 150 Inch-Pounds
Pressurizing Fitting (Appx E-4)
Pressurizing Fitting (Appx E-4)
Pressurizing Fitting (Appx E-4)

Materials:

Lockwire (E231)

Parts:

Packings

Personnel Required:

Aircraft Powertrain Repairer (2)
Inspector

References:

TM 55-1520-240-23P
Appendix E

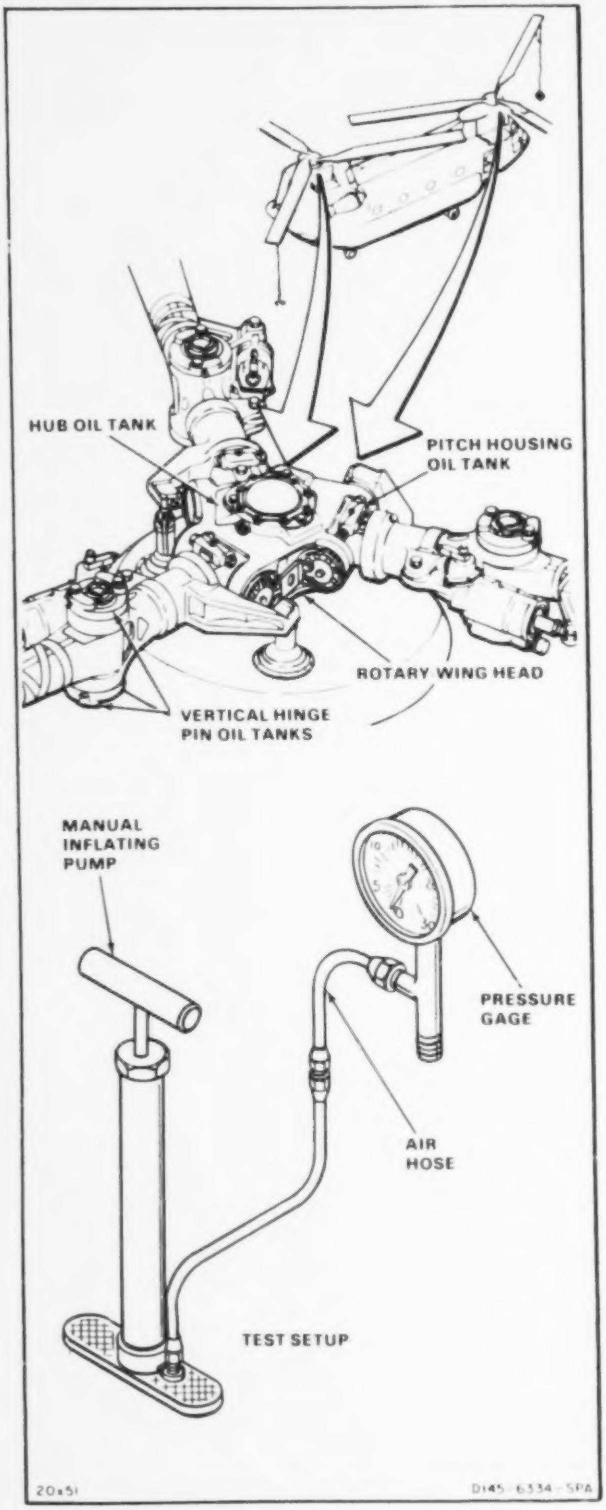
Equipment Condition:

Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied-Down (Task 1-26)
Work Platform Open (Task 2-2)
Pressure Test Setup

General Safety Instructions:

WARNING

Release pressure at fittings carefully. Otherwise lubricating oil can spray out. Lubricating oil can be harmful to nose, eyes, or mouth.


HUB OIL TANK
PITCH HOUSING OIL TANK
ROTARY WING HEAD
VERTICAL HINGE PIN OIL TANKS
MANUAL INFLATING PUMP
PRESSURE GAGE
AIR HOSE
TEST SETUP
20x51
D145-6334-SPA

GO TO NEXT PAGE

5-5 PRESSURE TEST ROTARY-WING HEAD SEALS AND PACKINGS (Continued) 5-5

NOTE

Test setup and procedure are same for testing all rotary-wing head seals and packings, except for size of pressurizing fitting and location of test connection.

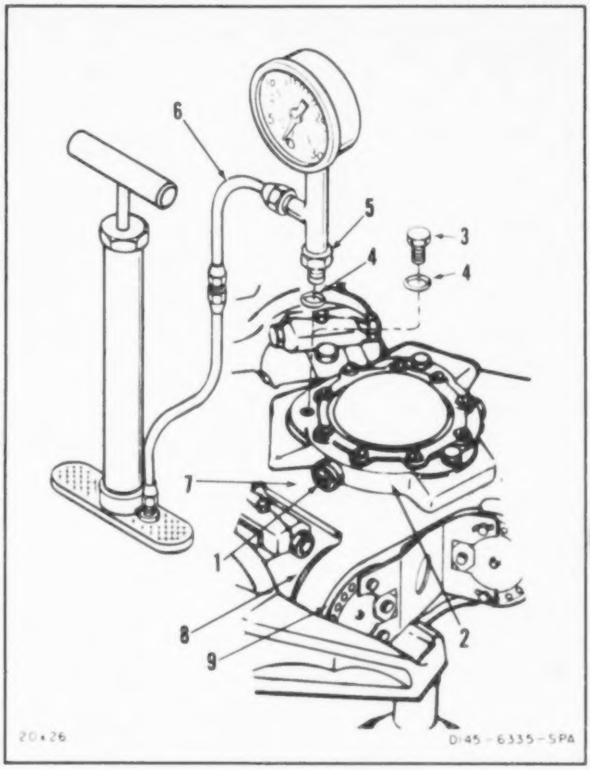
TEST ROTARY-WING HUB OIL SEALS AND PACKINGS

1. **Check oil level** in sight indicator (1). Service oil tank (2) if needed (Task 1-56).
2. Remove one filler plug (3) and packing (4). **Install pressurizing fitting (5)** and packing in tank (2). **Connect test setup (6)** to pressurizing fitting.

CAUTION

Do not exceed 20 psi when testing seals. High-pressure air will damage seals.

3. **Pressurize tank (2) to 3 to 5 psi. Maintain pressure for 10 minutes. Check hub (7) for oil leaks.** Check around pitch shaft (8) and end covers (9). There shall be no leaks.
4. **Increase pressure in tank (2) to 15 to 20 psi. Maintain pressure for 5 minutes. Check hub (7) for oil leaks.** Check around pitch shaft (8) and end covers (9). There shall be no oil leaks.



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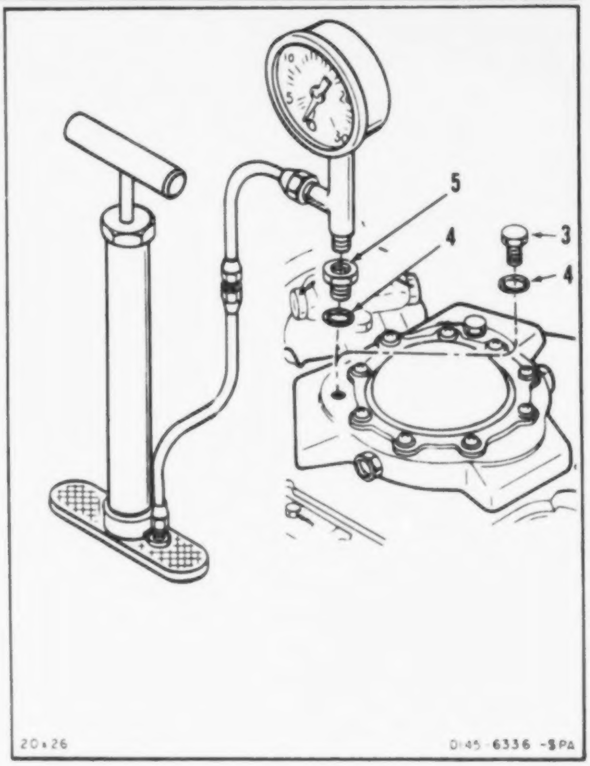
5-5 PRESSURE TEST ROTARY-WING HEAD SEALS AND PACKINGS (Continued) 5-5

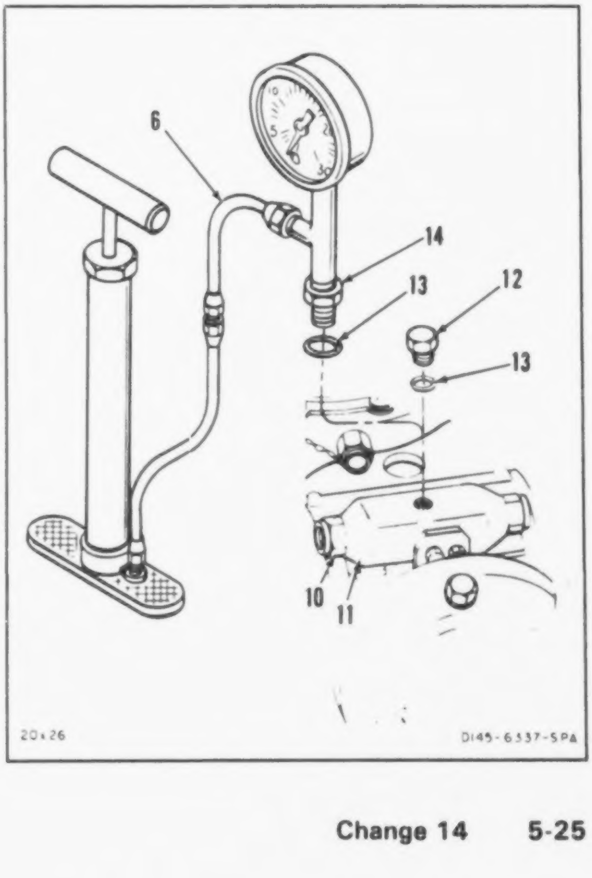
5. **Loosen pressurizing fitting (5)** just enough **to bleed pressure. When gage pressure reads 0 psi, remove fitting** and packing (4).
6. **Install** packing (4) and **plug (3). Torque plug to 85 inch-pounds.** Lockwire plug. Use lockwire (E231).

INSPECT



TEST PITCH-VARYING HOUSING OIL SEALS AND PACKINGS

7. **Check oil level** in sight indicator (10). Service oil tank (11) if needed (Task 1-57).
8. Remove filler plug (12) and packing (13). **Install pressurizing fitting (14) and packing** in tank (11). **Connect test setup (6)** to pressurizing fitting.



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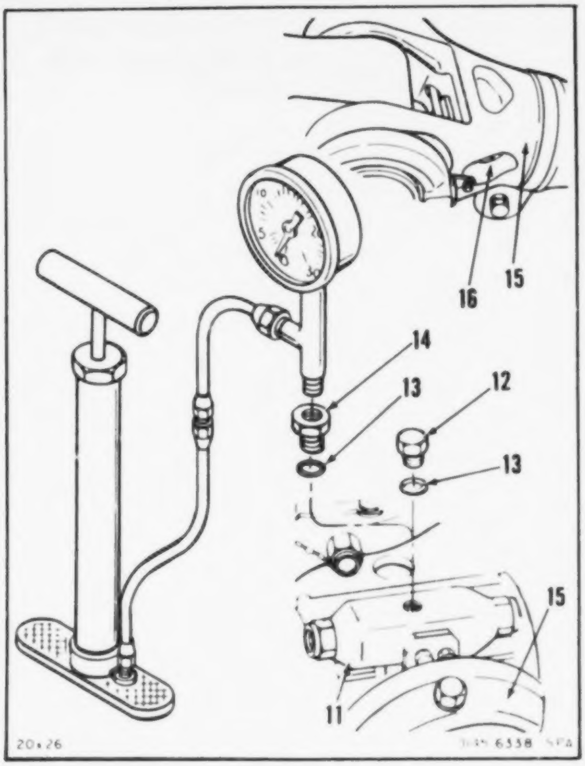
5-5 PRESSURE TEST ROTARY-WING HEAD SEALS AND PACKINGS (Continued) 5-5

CAUTION

Do not exceed 20 psi when testing seals. High-pressure air will damage seals.

9. **Pressurize tank (11) to 3 to 5 psi. Maintain pressure for 10 minutes. Check inboard end of pitch housing (15) for oil leaks. Check oil hole (16) at tie bar hole area under pitch housing. There shall be no leaks.**
10. **Increase pressure in tank (11) to 15 to 20 psi. Maintain pressure for 5 minutes. Check inboard end of pitch housing (15) for oil leaks.** Check oil hole (16) at tie bar hole area under pitch housing. There shall be no leaks.
11. **Loosen pressurizing fitting (14) just enough to bleed pressure. When gage pressure is 0 psi, remove fitting and packing (13).**
12. **Install** packing (13) and **plug (12). Torque plug to 25 inch-pounds.** Lockwire plug. Use lockwire (E231).



INSPECT

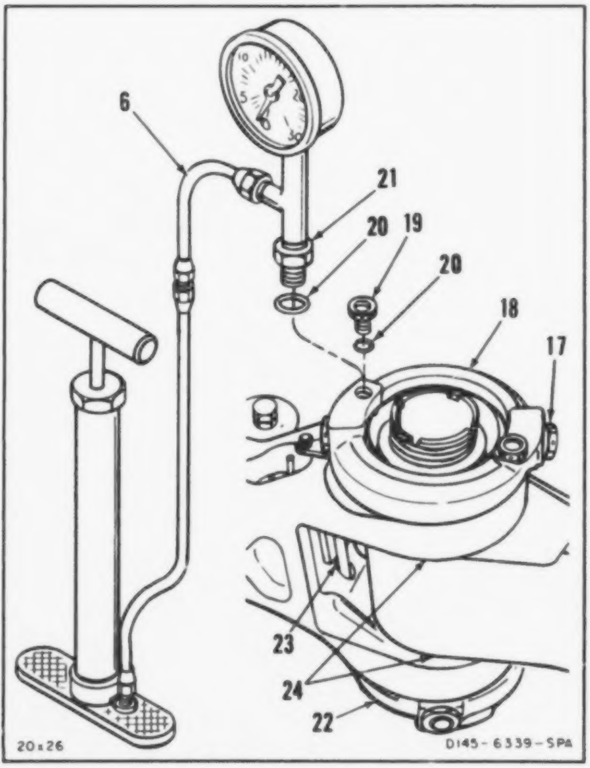
TEST VERTICAL HINGE PIN OIL TANK SEALS AND PACKINGS

13. **Check oil level** in sight indicator (17). Service oil tank (18) if needed (Task 1-59).
14. Remove one filler plug (19) and packing (20). **Install pressurizing fitting (21) and packing** in tank (18). **Connect test setup (6)** to pressurizing fitting.

CAUTION

Do not exceed 20 psi when testing seals. High pressure air can damage seals.

15. **Pressurize tank (18) to 3 to 5 psi. Maintain pressure for 10 minutes. Check tanks (18 and 22), oil manifold (23), and lugs (24), for oil leaks.** There shall be no leaks.
16. **Increase pressure in tanks (18 and 22) to 15 to 20 psi. Maintain pressure for 5 minutes. Check tanks, oil manifold (23), and lugs (24), for oil leaks.** There shall be no leaks.



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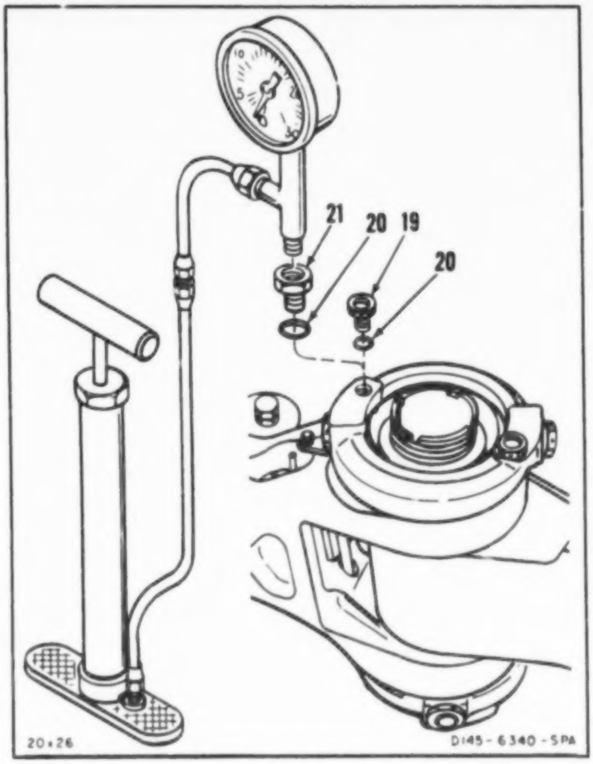
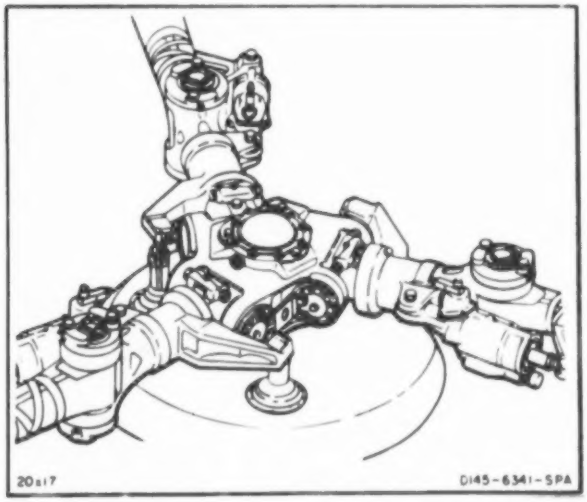
5-5 PRESSURE TEST ROTARY-WING HEAD SEALS AND PACKINGS (Continued) 5-5

17. **Loosen pressurizing fitting (21)** just enough **to bleed pressure. When gage pressure is 0 psi, remove fitting** and packing (20).
18. **Install** packing (20) and **plug (19). Torque plug to 85 inch-pounds.** Lockwire plug. Use lockwire (E231).

INSPECT


21
20
19
20
20x26
D145-6340-SPA


20x17
D145-6341-SPA

FOLLOW-ON MAINTENANCE:

Close work platform (Task 2-2).

END OF TASK

5-6 INSPECT ROTARY-WING HEADS 5-6

INITIAL SETUP

Applicable Configurations:

All

Tools:

Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:

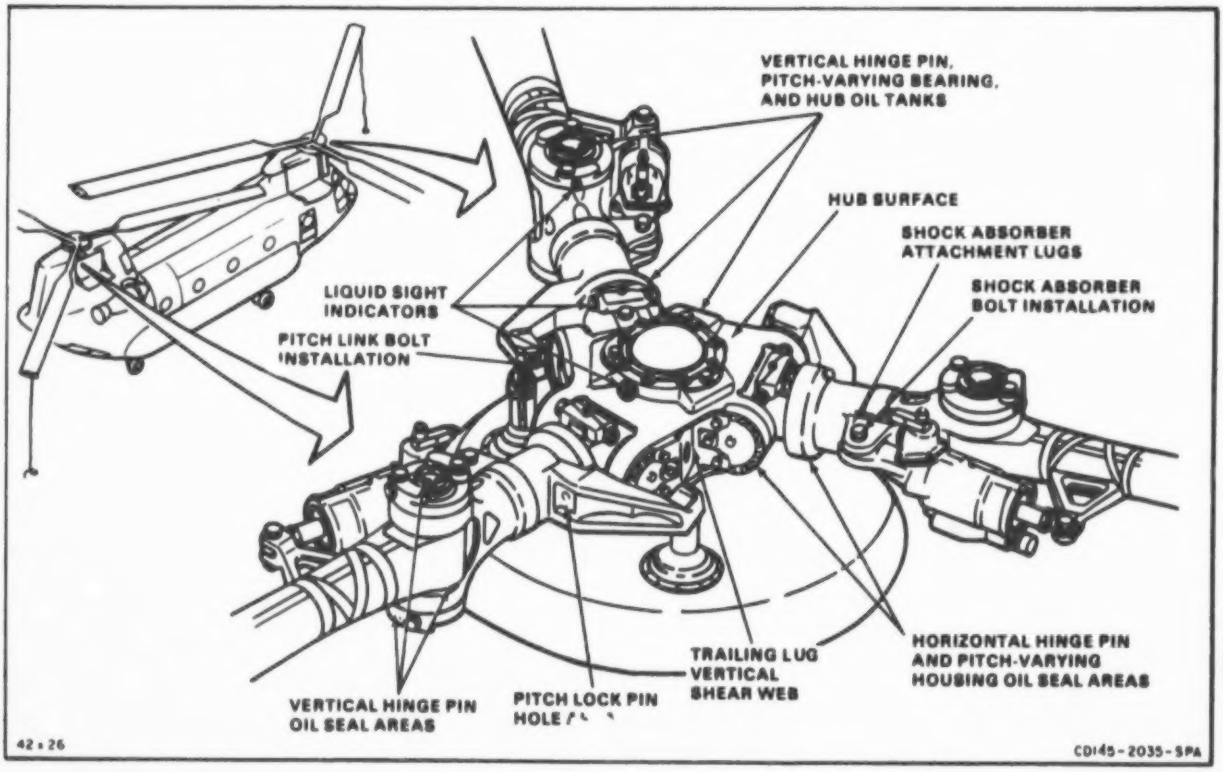
None

Personnel Required:

67U30 Inspector

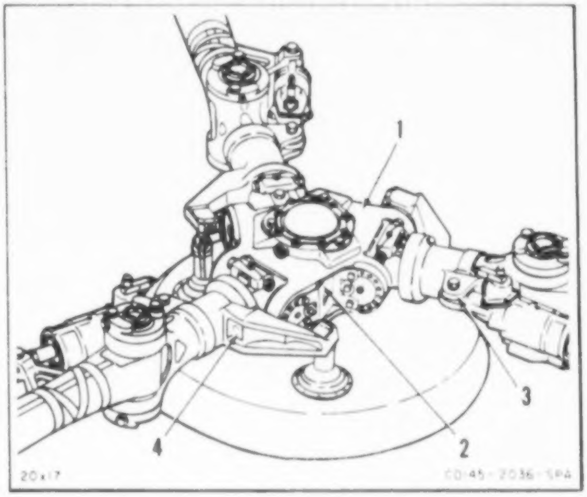
Equipment Condition:

Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Forward or Aft Work Platform Open (Task 2-2)
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)


VERTICAL HINGE PIN, PITCH-VARYING BEARING, AND HUB OIL TANKS
HUB SURFACE
SHOCK ABSORBER ATTACHMENT LUGS
SHOCK ABSORBER BOLT INSTALLATION
LIQUID SIGHT INDICATORS
PITCH LINK BOLT INSTALLATION
TRAILING LUG VERTICAL SHEAR WEB
HORIZONTAL HINGE PIN AND PITCH-VARYING HOUSING OIL SEAL AREAS
VERTICAL HINGE PIN OIL SEAL AREAS
PITCH LOCK PIN HOLE
42 x 26
CD145-2035-SPA

GO TO NEXT PAGE

5-6 INSPECT ROTARY-WING HEADS (Continued) 5-6



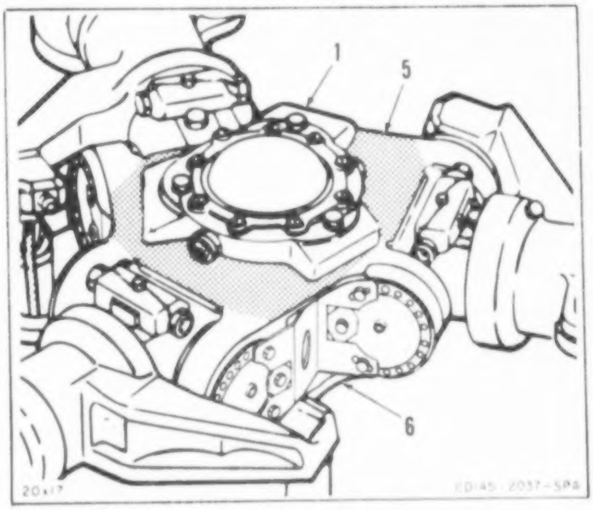
NOTE

- Paint removal is not required for rotary-wing head inspection. Use flashlight and mirror for hidden areas.
- Procedures can be used to inspect forward and aft rotary-wing heads.

1. **Check all surfaces of rotary-wing head (1),** including webs (2), lugs (3), and holes (4). There shall be no cracks, burns, or pits.

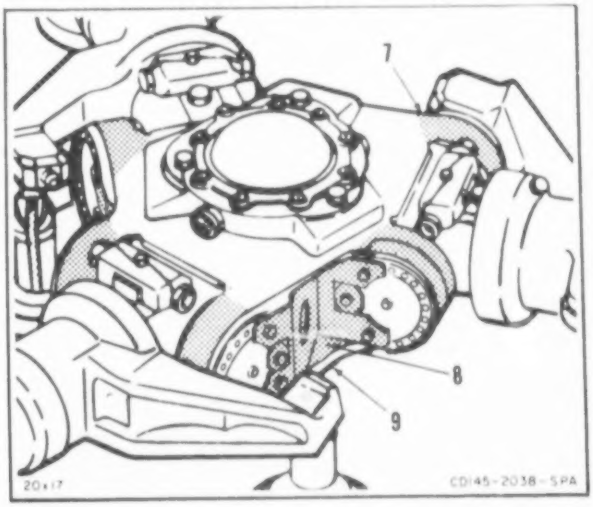
NOTE

Burns and pits indicate lightning strikes.



2. **Check rotary-wing head (1) for scores, nicks, or gouges that have gone through paint.** Check that damage is within rework limits as follows:

   a. Damage to top hub face (5) and bottom hub face (6) shall not exceed 0.005-inch in depth by 2.5-inches in length or 0.010-inch in depth by 1.0-inch in length.

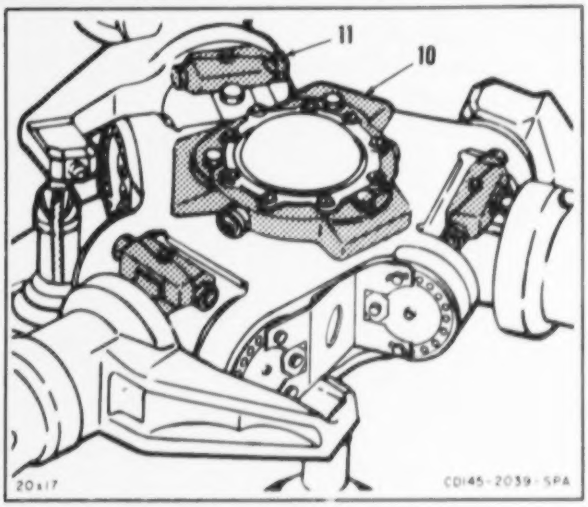


   b. Damage to six lugs (7), webs (8), and side surfaces (9) shall not exceed 0.005-inch in depth by 0.625-inch in length.

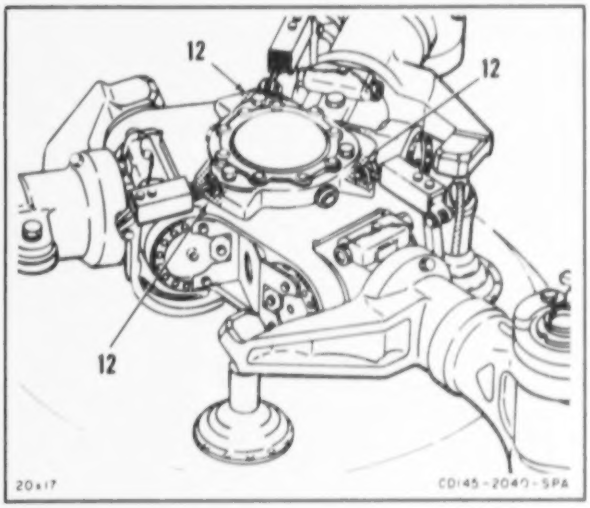
GO TO NEXT PAGE

5-6 INSPECT ROTARY-WING HEADS (Continued) 5-6

c. Damage to hub oil tank (10) and three pitch housing oil tanks (11) shall not exceed 0.020 inch in depth by 2.5 inches in length.


11
10
20x17
CD145-2039-SPA

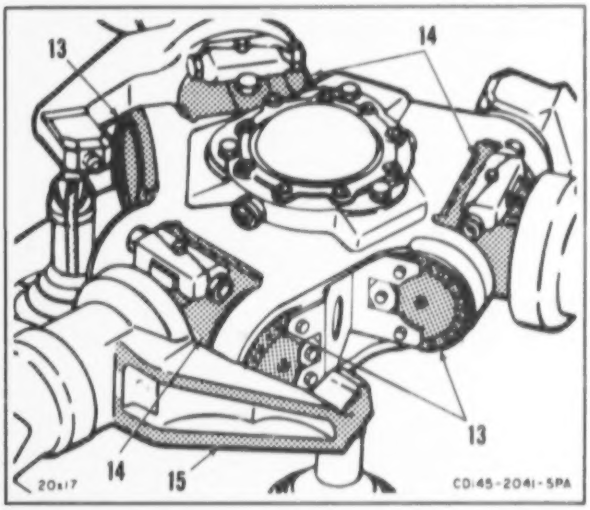
d. Damage around aft droop stop lugs (12) within 1 inch of lugs shall not exceed 0.005 inch in depth by 1.0 inch in length.


12
12
12
20x17
CD145-2040-SPA

e. Damage to horizontal pin caps (13) shall not exceed 0.010 inch in depth by 2.5 inches in length.

f. Damage to pitch shafts (14) shall not exceed 0.005 inch in depth by 2.5 inches in length.

g. Damage to edges of three pitch arms (15) shall not exceed 0.050 inch in depth.


13
14
13
20x17
14
15
CD145-2041-SPA

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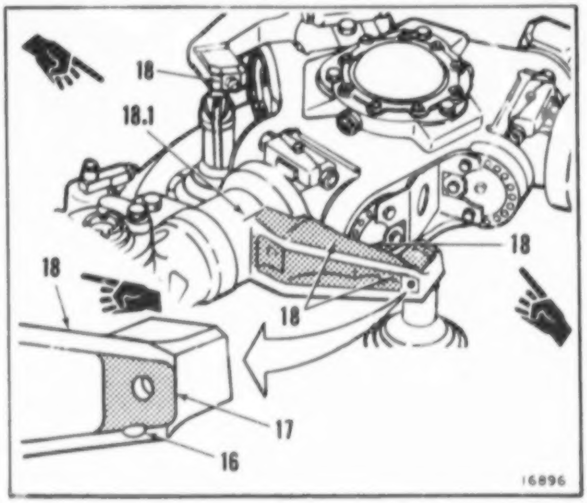
5-6 INSPECT ROTARY-WING HEADS (Continued) 5-6

h. Damage to edge of pitch arm (16) where washer contacts arm when pitch link bolt is installed shall not exceed 0.060 inch in depth.

i. Damage to arm faces (17) around bolt hole shall not exceed 0.040 inch in depth.

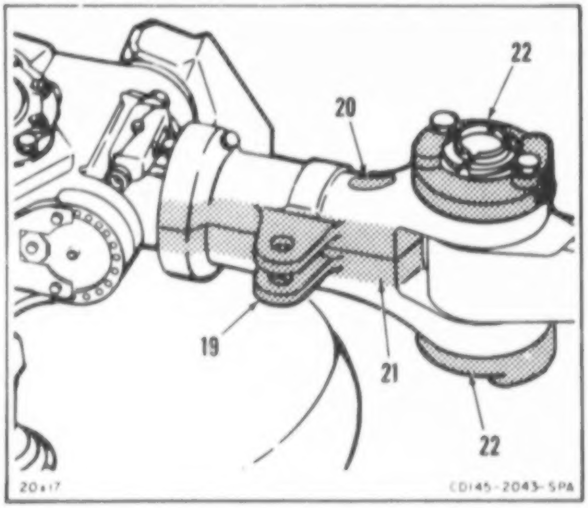
j. Damage to remaining areas (18) of pitch arm (16) shall not exceed 0.050 inch in depth.

j.1. Damage to fillet areas (18.1) where pitch arm blends into housing shall not exceed 0.010 inch in depth.



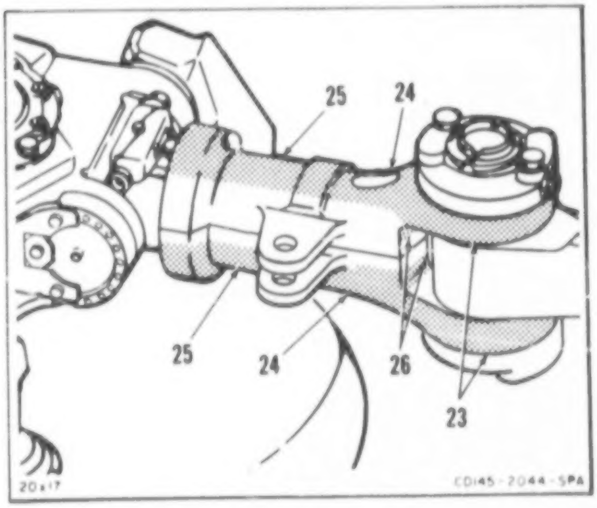
k. Damage to six lugs (19), pockets (20), and center housing areas (21) shall not exceed 0.005 inch in depth.

l. Damage to tanks (22) shall not exceed 0.020 inch in depth by 2.5 inches in length.



m. Damage to lugs (23) and outboard housing areas (24) shall not exceed 0.030 inch in depth. There is no restriction on damage area. Rework within this depth does not require shotpeening.

n. Damage to housing areas (25 and 26) shall not exceed 0.005 inch in depth by 2.5 inches in length.



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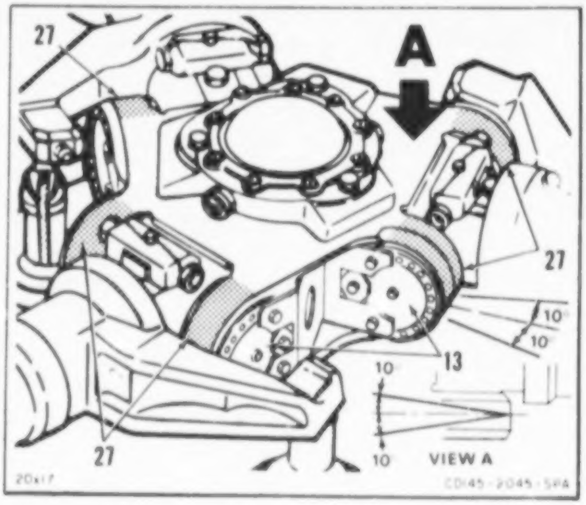
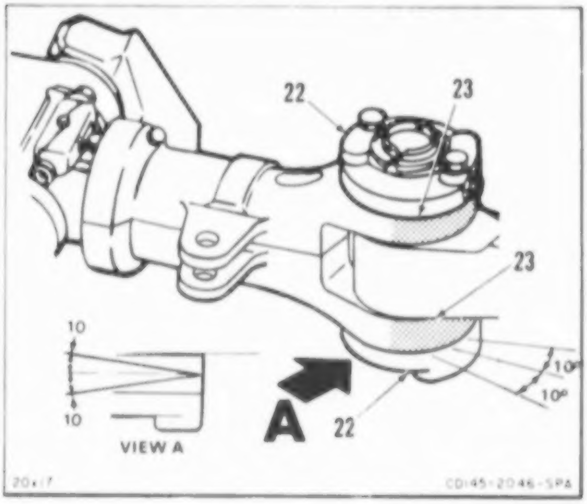
5-6 INSPECT ROTARY-WING HEADS (Continued) 5-6

3. **Check outboard hub areas (27) for scores.** Scores shall not be greater than 0.005-inch by 2.5-inches or 0.010-inch by 1.0-inch. Scores in outboard hub areas shall run parallel to caps (13) within 10 degrees.


27
A
27
10°
10°
13
10°
27
10°
VIEW A
20x17
CDI45-2045-SPA

4. **Check outboard side of lugs (23) for scores.** Scores shall not exceed 0.005-inch in depth by 1.0-inch in length. Scores in outboard side of lugs shall run parallel to tanks (22) within 10 degrees.


22
23
23
10
10°
10°
10
VIEW A
A
22
20x17
CDI45-2046-SPA

FOLLOW-ON MAINTENANCE:

Close work platform (Task 2-2).

END OF TASK

5-6.1 INSPECT ROTARY-WING HEAD OIL TANKS FOR ALLOWABLE OIL LEAKAGE 5-6.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

None

Materials:

None

Personnel Required:

Medium Helicopter Repairer
Rotary-Wing Aviator (2)

References:

Task 1-39	Task 5-32
Task 1-55	Task 5-33
Task 1-56	Task 5-34
Task 1-57	Task 5-35
Task 5-24	Task 5-42
Task 5-25	Task 5-43

TM 55-1520-240-10

Equipment Condition:

Helicopter Parked on Level Ground (Preferred)
Battery Disconnected (Task 1-39)
Electrical Power Off
Tiedown Line Installed on One Forward Blade (Task 1-26)
Aft Pylon Work Platforms Open (Task 2-2)
Forward Transmission Fairing Work Platforms Open (Task 2-2)

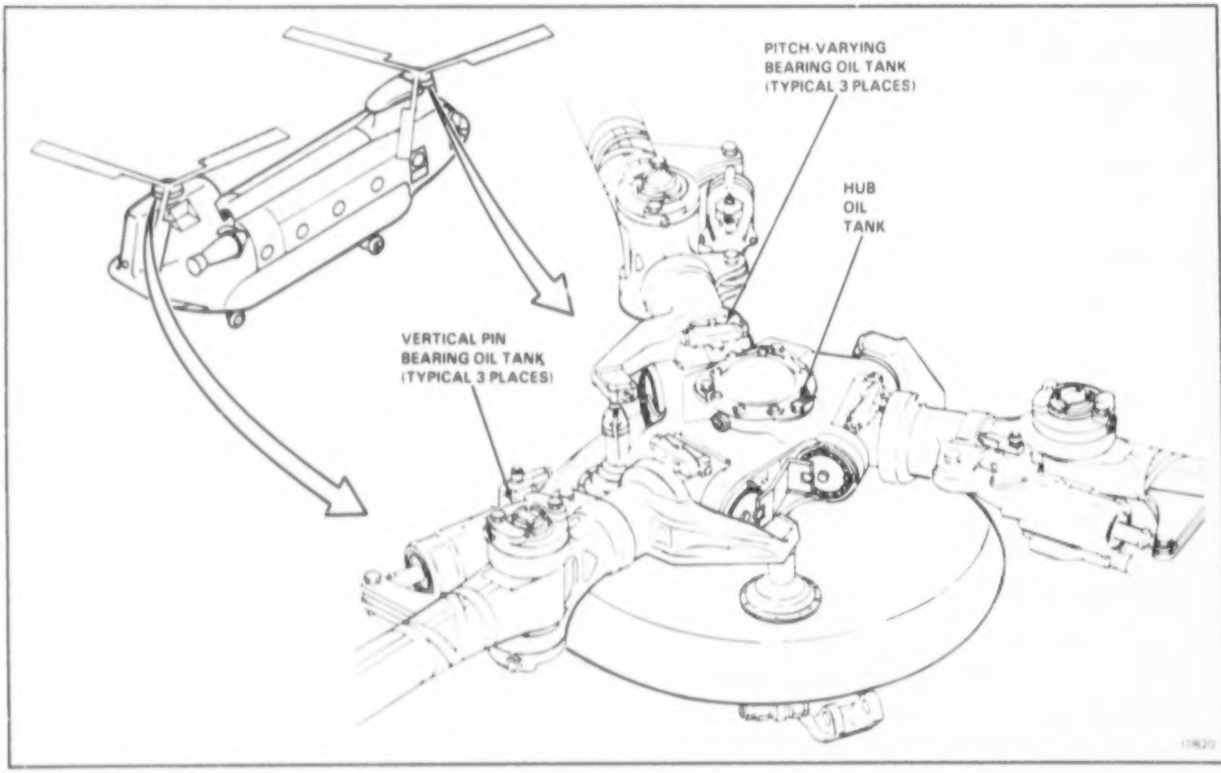
General Safety Instructions:

WARNING

Prolonged oil leakage can damage finish and create a work hazard by making the fuselage slippery. It can also affect other systems in the helicopter. Therefore, good judgment must be used when determining allowable leakage.

WARNING

Rotor blades can seriously injure personnel. Make sure area around helicopter is clear of personnel before moving rotor blades.



GO TO NEXT PAGE

5-6.1 INSPECT ROTARY-WING HEAD OIL TANKS FOR ALLOWABLE OIL LEAKAGE (Continued) 5-6.1

NOTE

Due to time required, it is best to perform this inspection during a scheduled flight of at least two hours.

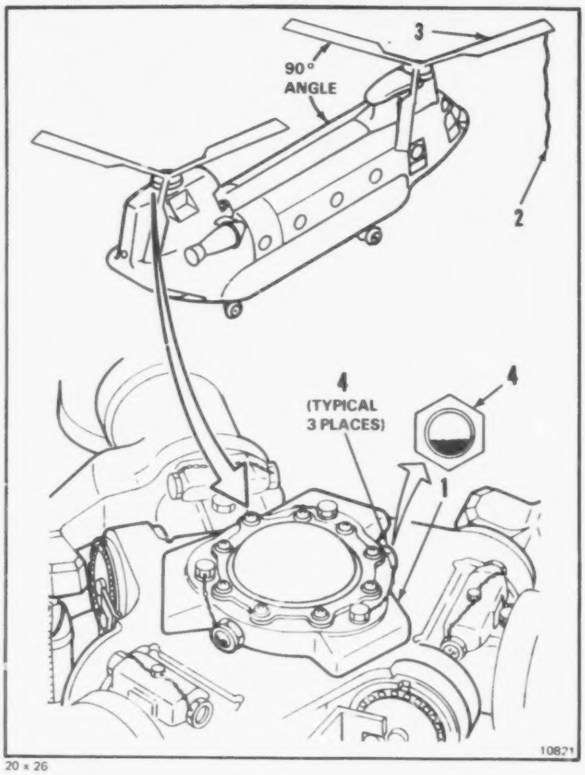
HUB OIL TANK

1. **Service hub oil tank (1)** (Task 1-55).
2. **Connect battery** (Task 1-39).
3. Have pilot perform a 30-minute ground run (TM 55-1520-240-10).
4. **Disconnect battery** (Task 1-39).
5. **Install tiedown line (2)** on one forward blade (3) (Task 1-26).

NOTE

Blades must be in proper position to get a correct reading of oil level.

6. Using tiedown line (2), **turn blades (3)** so that one is positioned at a 90 degree angle to left or right side of helicopter.
7. **Check oil level** in sight gage (4) next to blade (3) that is at 90 degree angle. If oil is at bottom of gage, leakage is excessive.
8. **If leakage is excessive, horizontal hinge pin seals are defective.** Replace seals (Tasks 5-42 and 5-43).



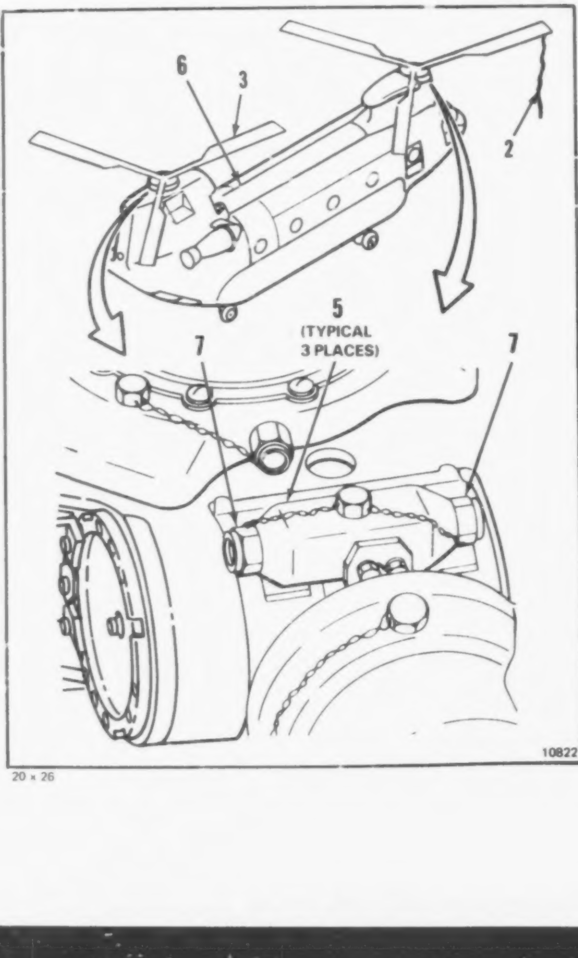
PITCH BEARING OIL TANK

9. **Service pitch bearing oil tank (5)** (Task 1-56).
10. **Connect battery** (Task 1-39).
11. Have pilot perform a 30-minute ground run (TM 55-1520-240-10).
12. **Disconnect battery** (Task 1-39).
13. **Install tiedown line (2)** on one forward blade (3) (Task 1-26).

NOTE

Blades must be in proper position to get a correct reading of oil level.

14. Using tiedown line (2), **turn blades (3)** so that blade of tank (5) to be checked is over drive shaft tunnel (6).
15. **Check oil level** in sight gage (7) on each side of oil tank (5) of blade (3) over tunnel (6). If average level at two gages is at bottom of sight gage, leakage is excessive.
16. **If leakage is excessive, pitch-varying housing oil seals are defective.** Replace seals (Tasks 5-24 and 5-25).



GO TO NEXT PAGE

5-6.1 INSPECT ROTARY-WING HEAD OIL TANKS FOR ALLOWABLE OIL LEAKAGE (Continued) 5-6.1

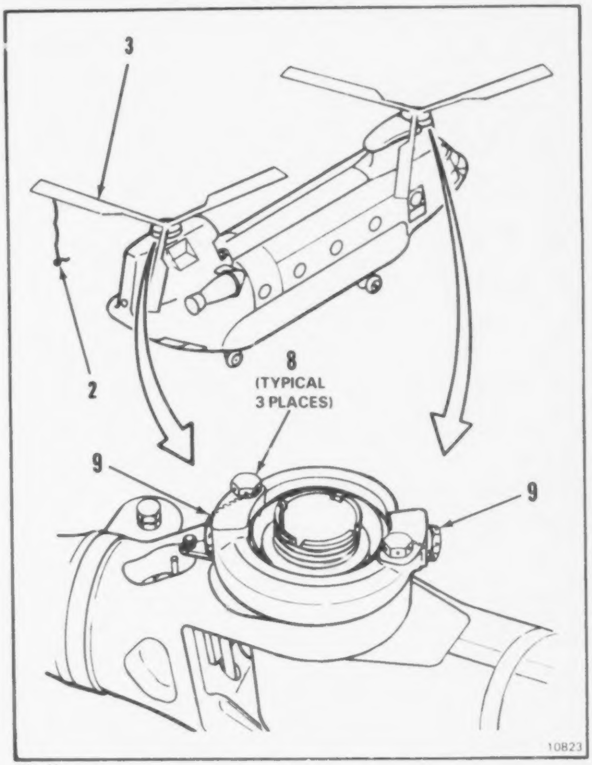
VERTICAL HINGE PIN OIL TANKS

17. **Service vertical hinge pin oil tanks (8)** (Task 1-57).
18. **Connect battery** (Task 1-39)
19. Have pilot perform a 30-minute ground run (TM 55-1520-240-10).
20. **Disconnect battery** (Task 1-39).
21. **Install tiedown line (2)** on one aft blade (3) (Task 1-26).

NOTE

Tank must be horizontal to get a correct reading of oil level.

22. Using tiedown line (3), **turn rotor blades (2)** so that oil tank (8) to be checked is horizontal.
23. **Check oil level** in sight gage (9) on each side of oil tank (8). If average level at two gages is at bottom of sight gage, leakage is excessive.
24. **If leakage is excessive, vertical hinge pin oil tank seals are defective.** Replace seals (Tasks 5-32 thru 5-35).



FOLLOW-ON MAINTENANCE:

Close forward transmission fairing work platforms (Task 2-2).

Close aft pylon work platforms (Task 2-2).

Remove tiedown line from blade (Task 1-26).

END OF TASK

5-7 REPAIR ROTARY-WING HEADS 5-7

INITIAL SETUP

Applicable Configurations:

All

Tools:

Technical Inspection Tool Kit, NSN 5180-00-323-5114

Powertrain Repairer Tool Kit, NSN 5180-00-003-5267

Protractor

Materials:

Crocus Cloth (E122)

Personnel Required:

Aircraft Powertrain Repairer

Inspector

References:

TM 55-1520-240-23P

Task 2-348

Task 2-347

Task 2-346

Task 2-353

Equipment Condition:

Battery Disconnected (Task 1-39)

Electrical Power Off

Hydraulic Power Off

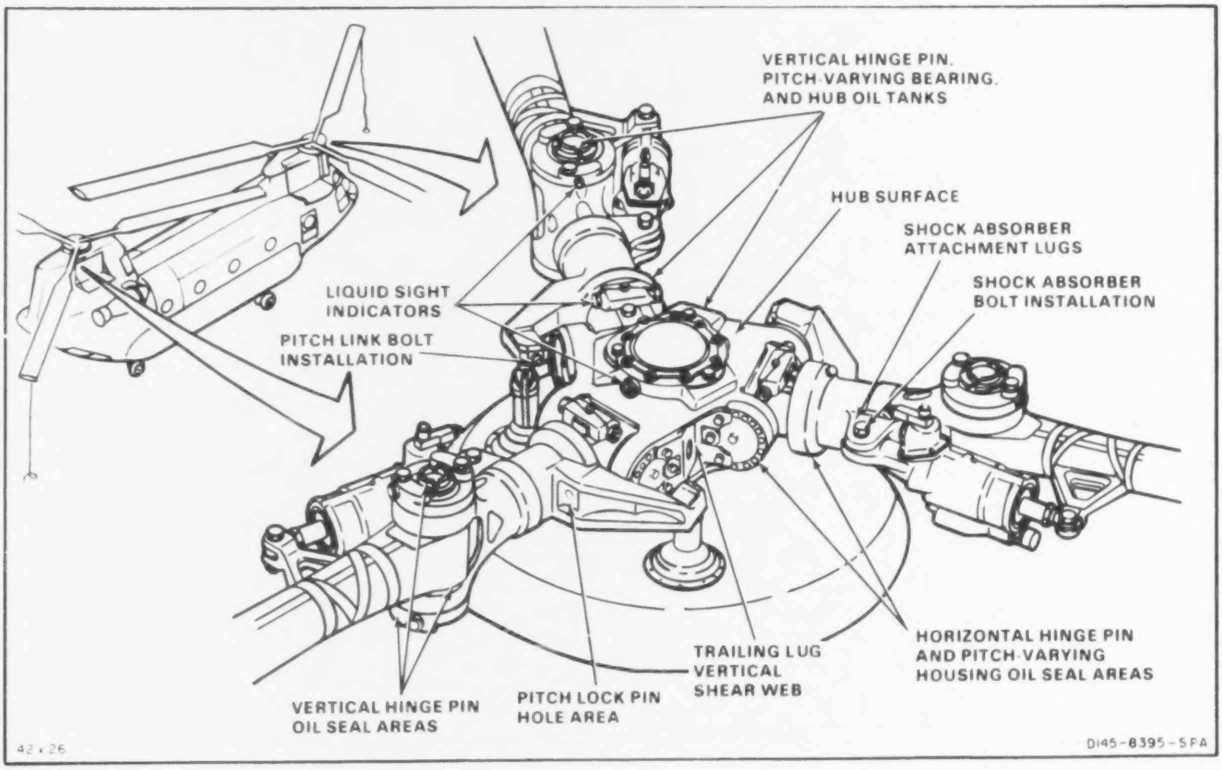
Forward or Aft Work Platform Open (Task 2-2)

Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)

General Safety Instructions:

WARNING

Do not repair cracks, burns, or pits in rotary-wing head. Part failure could occur with possible loss of helicopter and loss of personnel.


VERTICAL HINGE PIN, PITCH-VARYING BEARING, AND HUB OIL TANKS
HUB SURFACE
SHOCK ABSORBER ATTACHMENT LUGS
SHOCK ABSORBER BOLT INSTALLATION
LIQUID SIGHT INDICATORS
PITCH LINK BOLT INSTALLATION
TRAILING LUG VERTICAL SHEAR WEB
HORIZONTAL HINGE PIN AND PITCH-VARYING HOUSING OIL SEAL AREAS
VERTICAL HINGE PIN OIL SEAL AREAS
PITCH LOCK PIN HOLE AREA
42 x 26
D145-8395-SFA

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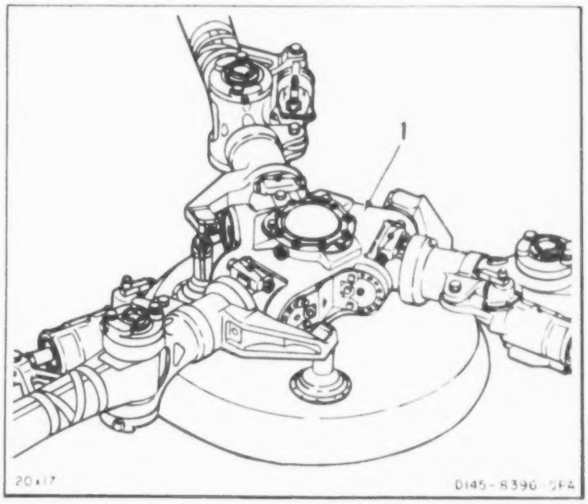
5-7 REPAIR ROTARY-WING HEADS (Continued) 5-7

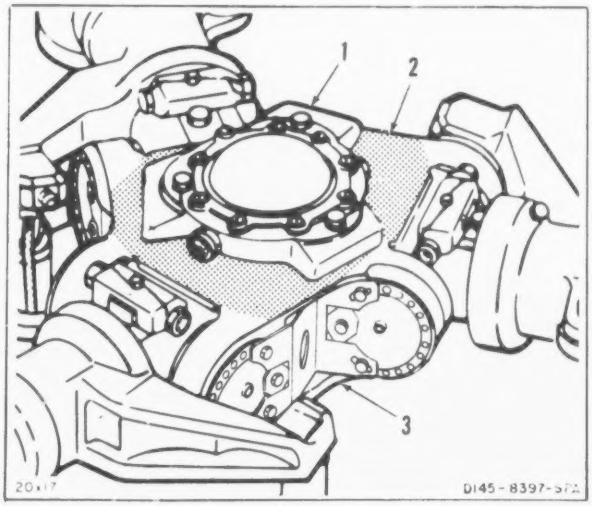
NOTE

- Procedure is similar to repair forward or aft rotary-wing head. Differences are noted in text.
- Damage limits and refinishing differ for each area of rotary-wing head.

1. **Repair rotary-wing head (1)** as follows:
   a. Blend repair scores, nicks, or gouges so no sign of damage remains. Rework no deeper than damage.
   b. Use only crocus cloth (E122) applied with finger pressure.
   c. Blend with smooth radius at least 10 times as wide as depth of damage.
   d. Refinish reworked areas as soon as possible.



2. **Follow damage limits and refinishing procedures for specific areas of rotary-wing head (1) as described:**
   a. Damage to top hub face (2) and bottom hub face (3) shall not exceed 0.005-inch in depth by 2.5-inches in length or 0.010-inch in depth by 1.0-inch in length. Refinish (Task 2-348).



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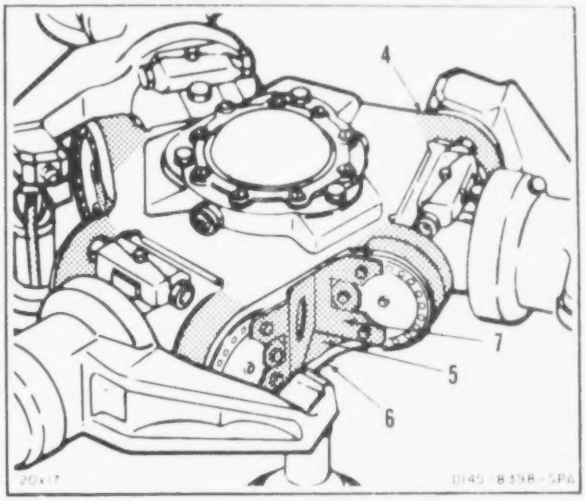
b. Damage to six lugs (4), webs (5), and side surfaces (6) shall not exceed 0.005-inch in depth by 0.625-inch in length. Refinish (Task 2-348).

c. Damage to locking beam (7) is not limited, but must be refinished (Task 2-346).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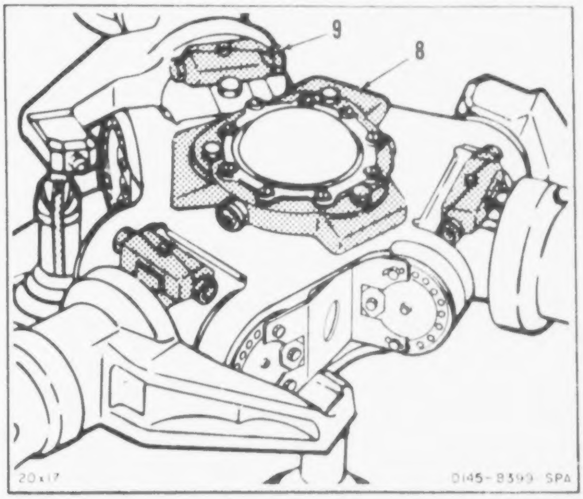
d. Damage to hub oil tank (8) and three pitch housing oil tanks (9) shall not exceed 0.020-inch in depth by 2.5-inches in length. Refinish (Task 2-347).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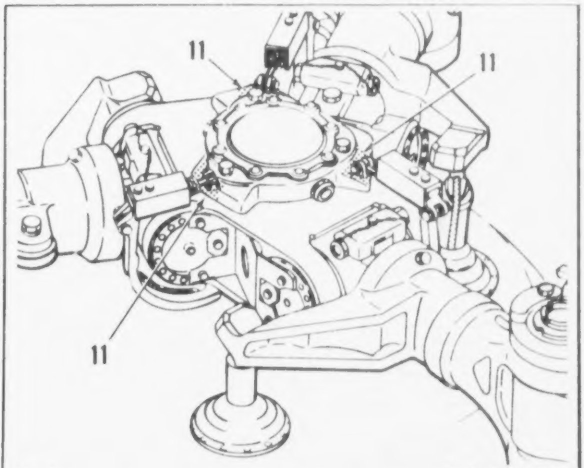
e. Damage around aft droop stop lugs (11) within 1-inch of lugs shall not exceed 0.005-inch in depth by 1.0-inch in length. Refinish (Task 2-347).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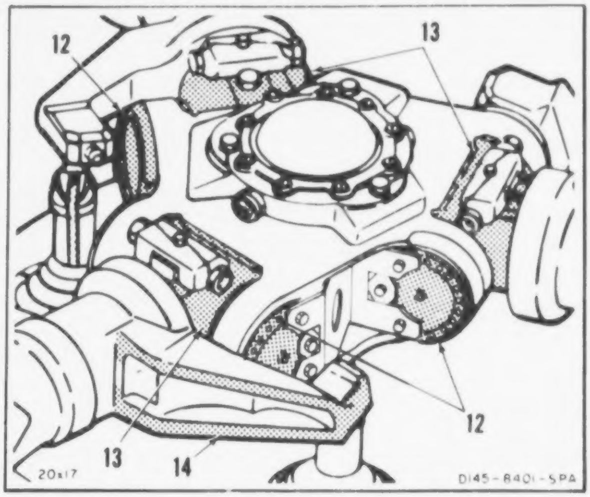
5-7 REPAIR ROTARY-WING HEADS (Continued) 5-7

f. Damage to horizontal pin caps (12) shall not exceed 0.010 inch in depth by 2.5 inches in length. Refinish (Task 2-346).

g. Damage to pitch shafts (13) shall not exceed 0.005 inch in depth by 2.5 inches in length. Rework area shall not exceed 1.0 square inch. Refinish (Task 2-346).

h. Damage to edges of three pitch arms (14) shall not exceed 0.050 inch in depth. Refinish (Task 2-346).

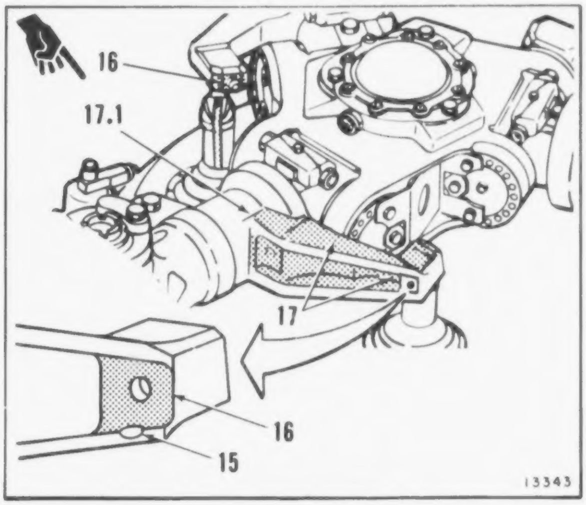


i. Damage to edge of pitch arm (15) where washer contacts arm when pitch link bolt is installed shall not exceed 0.060 inch in depth. Refinish (Task 2-346).

j. Damage to arm faces (16) around bolt hole shall not exceed 0.040 inch in depth. Refinish (Task 2-346).

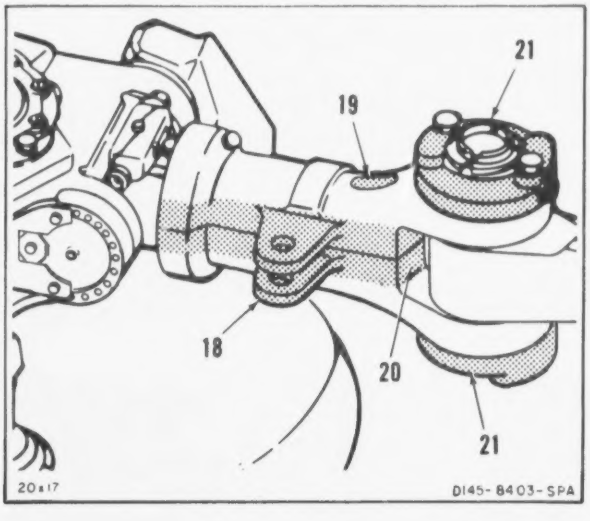
k. Damage to remaining areas (17) of pitch arm (15) shall not exceed 0.050 inch in depth. Rework area shall not exceed 1.2 square inches. Refinish (Task 2-346).

k.1. Damage to fillet areas (17.1) where pitch arm blends into housing shall not exceed 0.010 inch in depth. Repairs more than 0.005 inch deep require shotpeening. Refinish (Task 2-346).



l. Damage to six lugs (18), pockets (19), and center housing areas (20) shall not exceed 0.003 inch in depth. Rework area shall not exceed 1.2 square inches. Refinish (Task 2-346).

m. Damage to tanks (21) shall not exceed 0.020 inch in depth by 2.5 inches in length. Refinish (Task 2-353).



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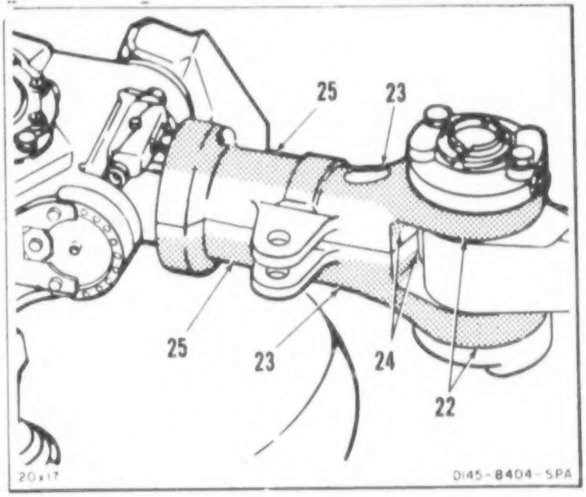
n. Damage to lugs (22) and outboard housing areas (23) shall not exceed 0.008 inch in depth by 0.625 inch in length. Refinish (Task 2-346).

o. Damage to housing areas (24 and 25) shall not exceed 0.005 inch in depth by 2.5 inches in length. Rework area shall not exceed 1.2 square inches. Refinish (Task 2-346).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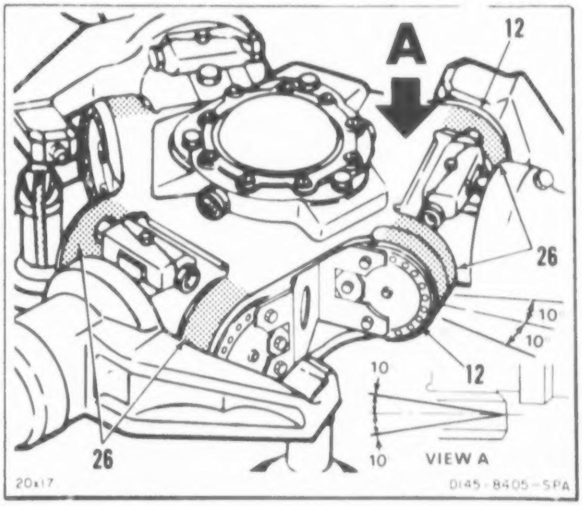
p. Scores in outboard hub areas (26) shall not be greater than 0.005 inch by 0.625 inch. Scores in outboard hub areas shall run parallel to end caps (12) within 10 degrees. Refinish (Task 2-348).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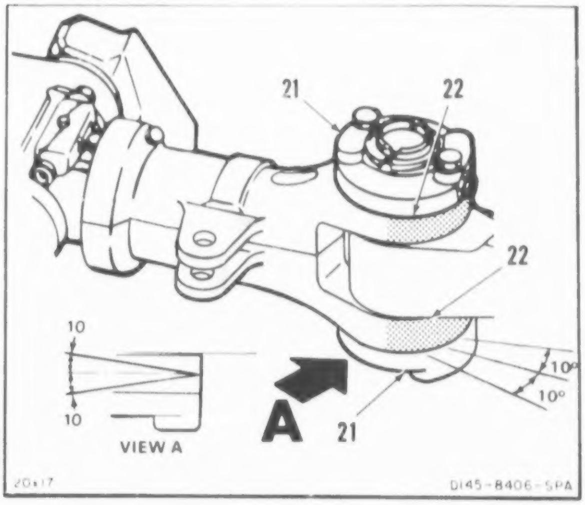
q. Scores in outboard side of lugs (22) shall not exceed 0.005 inch in depth by 1.0 inch in length. Scores in outboard side of lugs shall run parallel to tanks (21) within 10 degrees. Refinish (Task 2-346).

FOLLOW-ON MAINTENANCE:

Close work platform (Task 2-2).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END OF TASK

5-8 REMOVE ROTARY-WING HEAD

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic Tool Kit, NSN 5180-00-323-4692
Rotor Head Lifting Device (T30)
Handling Adapter (T13)
Torque Applicator (T2)
Reaction Adapter (T28)
Tee Handle (T161)
Socket (T29)
Rope Guide Lines
Hoist

Materials:

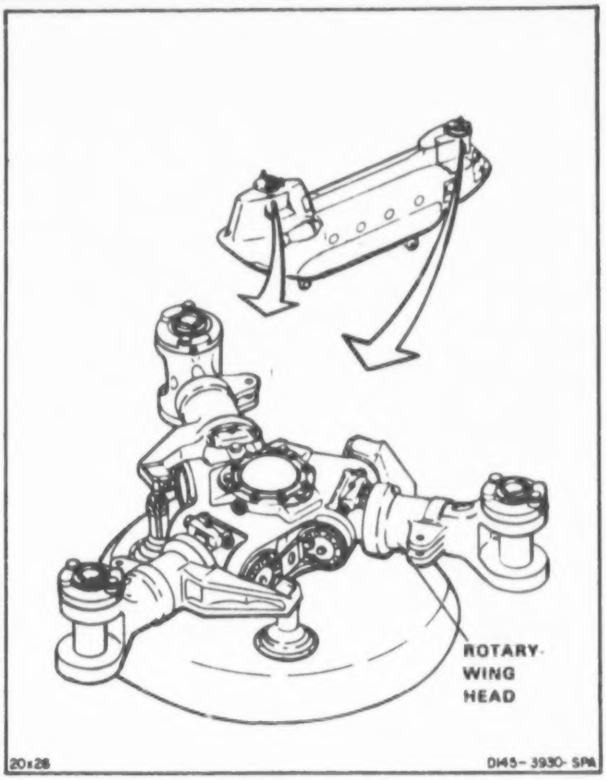
Barrier Material (E80)
Tape (E388)
Cloth (E120)

Personnel Required:

Medium Helicopter Repairer (6)

Equipment Condition:

Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Rotary-Wing Blades Removed, if Required (Task 5-64)
Tiedown Lines Installed on All Three Blades, if Installed, of Applicable Rotary-Wing Head (Task 1-26).
Lead-Lag Rigging Tools (T22) Installed on Blades of Applicable Rotary-Wing Head (Task 11-30)
Forward or Pylon Work Platform Open (Task 2-2)
Pitch Lock Pins (T22) Installed on Applicable Rotary-Wing Head (Task 5-96.1)
Droop Stop Shroud Assemblies Removed from Aft Rotary-Wing Head, if Applicable (Task 5-48.1)



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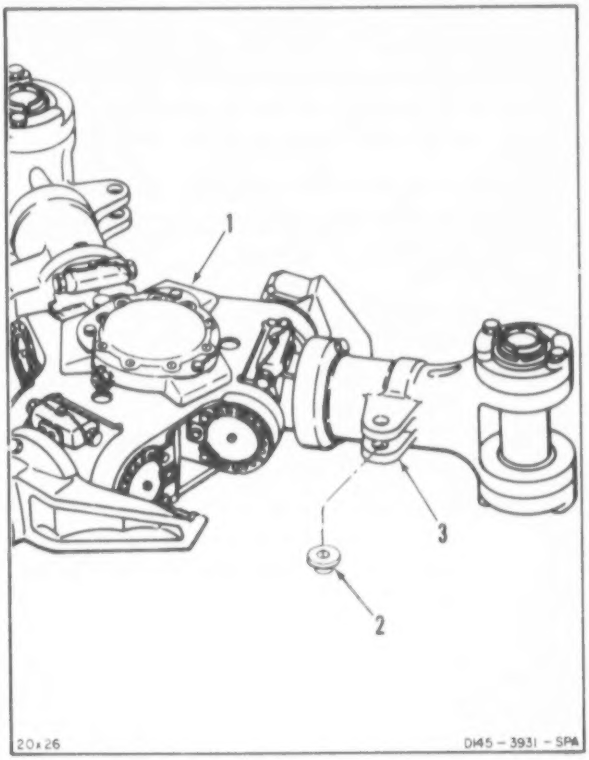
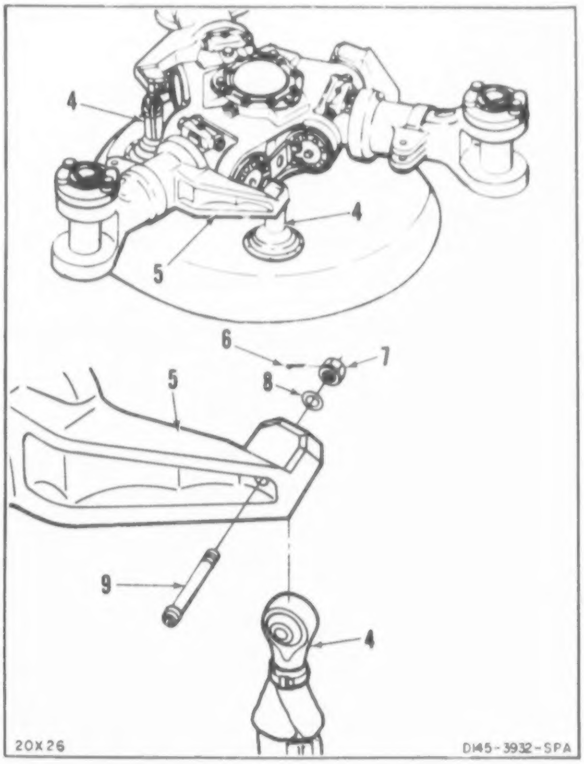
NOTE

- Procedure is similar to remove rotary-wing head with or without blades attached. Removal of rotary-wing head with blades removed is shown.
- Task is similar for forward and aft rotary-wing heads. Differences are noted in text. With blades off, forward rotary-wing head can be removed with forward transmission package installed in workstand.



PREPARE HEAD

1. **If head (1) will be replaced, remove three sliding bushings (2)** from lower lugs (3).



2. **Disconnect three pitch links (4)** from pitch housings (5) as follows:
   a. Remove cotter pin (6).
   b. Remove nut (7), washer (8), and bolt (9).
   c. Disconnect pitch link (4).
   d. Install bolt (9), washer (8), and nut (7) in housing (5).

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5-8 REMOVE ROTARY-WING HEAD (Continued) 5-8

NOTE

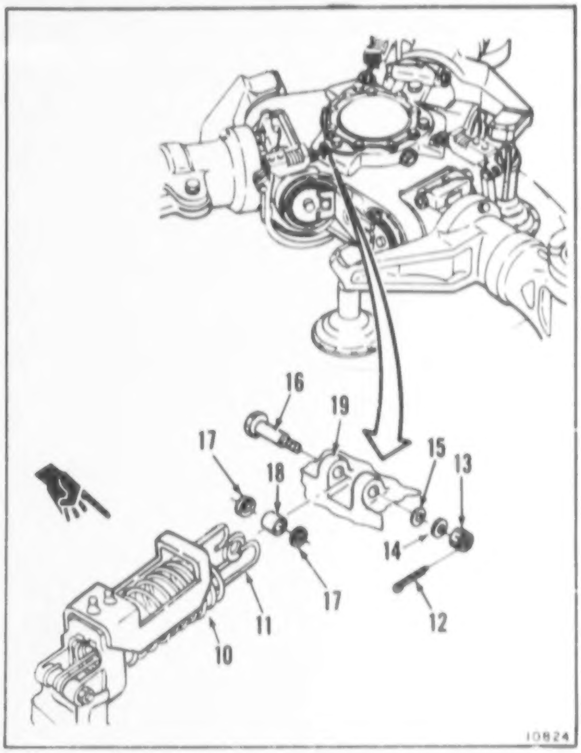
Support spring load before removing bolt. Sudden release of spring will cause small parts to fly out of lugs.

3. On aft head only, **disconnect centrifugal droop stop springs (10) and limiter springs (11)** as follows:

   a. Remove cotter pin (12), nut (13), and washers (14 and 15).

   b. Support spring load and remove bolt (16). Remove spring (10), two washers (17), bearing (18), and inboard limiter spring (11) from lugs (19).

   c. Assemble bearing (18), two washers (17), spring (10) and limiter spring (11). Use bolt (16), washers (14 and 15), and nut (13).



CAUTION

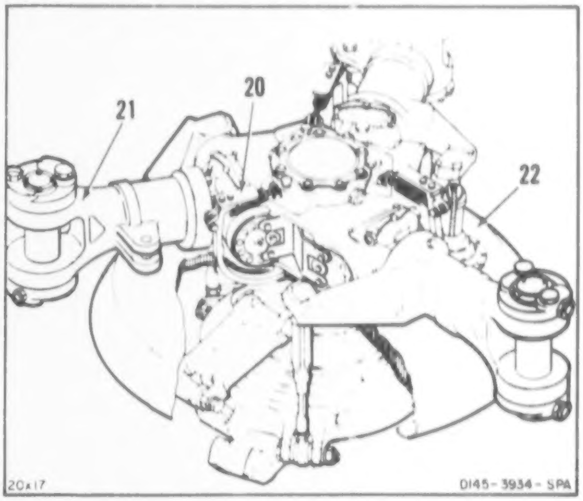
Do not lift pitch housing when removing aft head without supporting balancing arm. Lifting housing will allow arm to fall against other parts when springs and limiters are not connected. Damage to equipment can occur.

4. Lower three balancing arms (20) as follows:

   a. Hold balancing arm (20) in place.

   b. Lift housing (21).

   c. Lower arm (20) slowly until it rests on weather protective cover (22).



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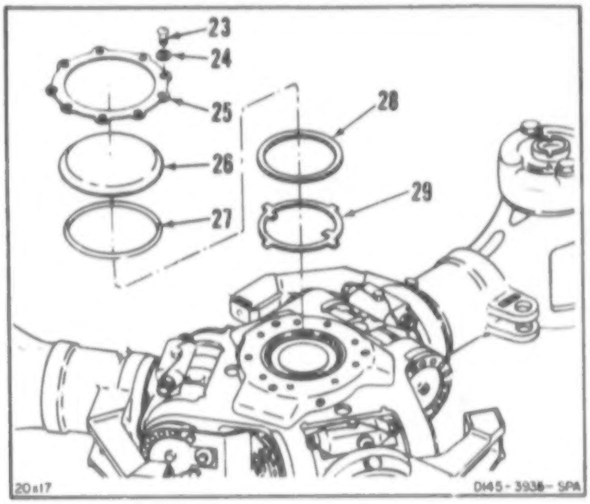
5-8 REMOVE ROTARY-WING HEAD (Continued) 5-8

5. Remove nine screws (23) and washers (24).
6. **Remove** retainer (25), **cover (26)**, and packing (27).
7. Remove retaining ring (28) and tang washer (29).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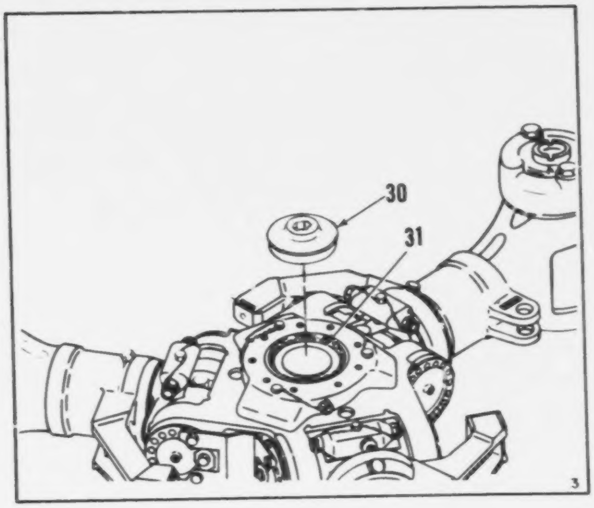
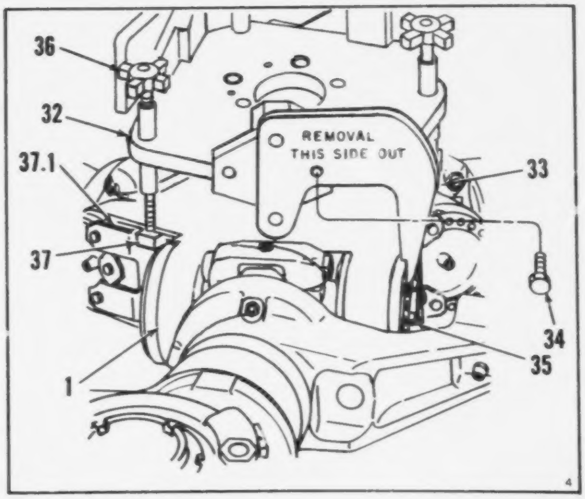
REMOVE RETAINING NUT

8. **Position socket (T29) (30) on hub retaining nut (31).**





NOTE

For forward head, install adapter with marking FWD ROTOR THIS SIDE UP on top. For aft head, install adapter with marking AFT ROTOR THIS SIDE UP on top.

9. **Install reaction adapter (T28) (32)** as follows:

   a. Secure three reaction hooks (33) to adapter (T28) (32), with REMOVAL side out. Use bolts (34).

   b. Position adapter (T28) (32) on top of head (1) with reaction hooks (33) against caps (35) and with handwheels (36) on top.

CAUTION

Do not overtighten handwheels; otherwise, damage to rotor head or adapter can occur.

   c. Position three clamps (37) under top flange (37.1) of head (1). Tighten handwheels (36).

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5-8 REMOVE ROTARY-WING HEAD (Continued) 5-8

10. **Install torque applicator (T2) (38) and tee handle (T161) (39)** on reaction adapter (T28) (32). Turn handle, if required, to rotate applicator to engage reaction pins (39.1) in adapter.

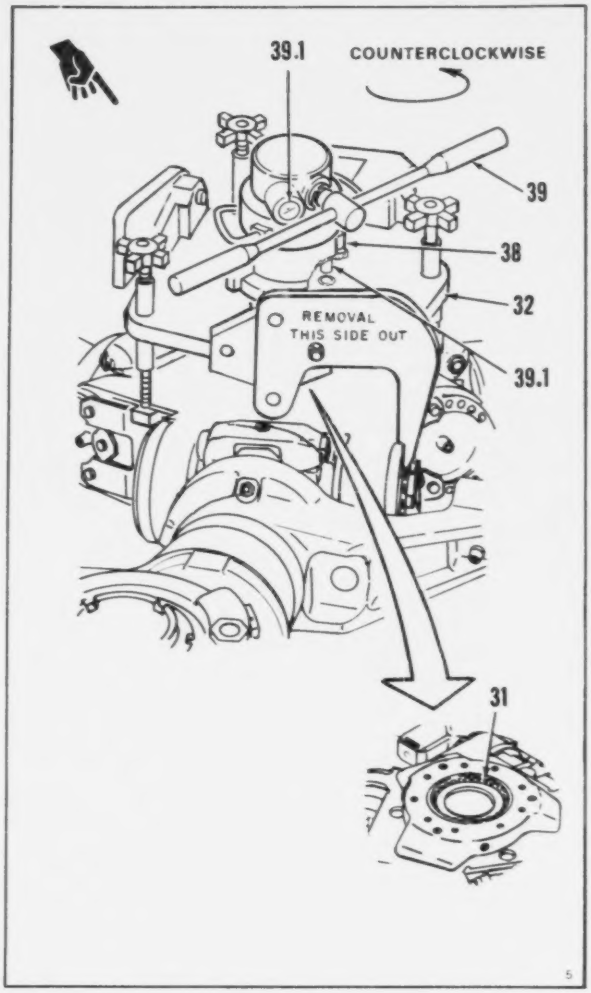
CAUTION

Do not use power tools to turn torque applicator. Applicator could be severely damaged.

NOTE

Pins under torque applicator must be fully seated in reaction adapter (T28) to prevent applicator ride-up when torque is first applied.

11. **Turn handle (39) counterclockwise** until nut (31) is loose.
12. Continue to loosen nut (31) until torque drops to near 0 foot-pounds. Use speed handle if available.
13. Try to rock applicator (T2) (38). If applicator rocks, go to step 14. If applicator cannot be moved, continue to turn handle (39) until torque forces are relieved. Remove handle.



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14. **Remove torque applicator (T2) (38).**

14.1. **Remove reaction adapter (T28) (32)** as follows:

   a. Loosen three handwheels (36).

   b. Turn clamps (37) outward.

   c. Lift reaction adapter (32) from head (1).

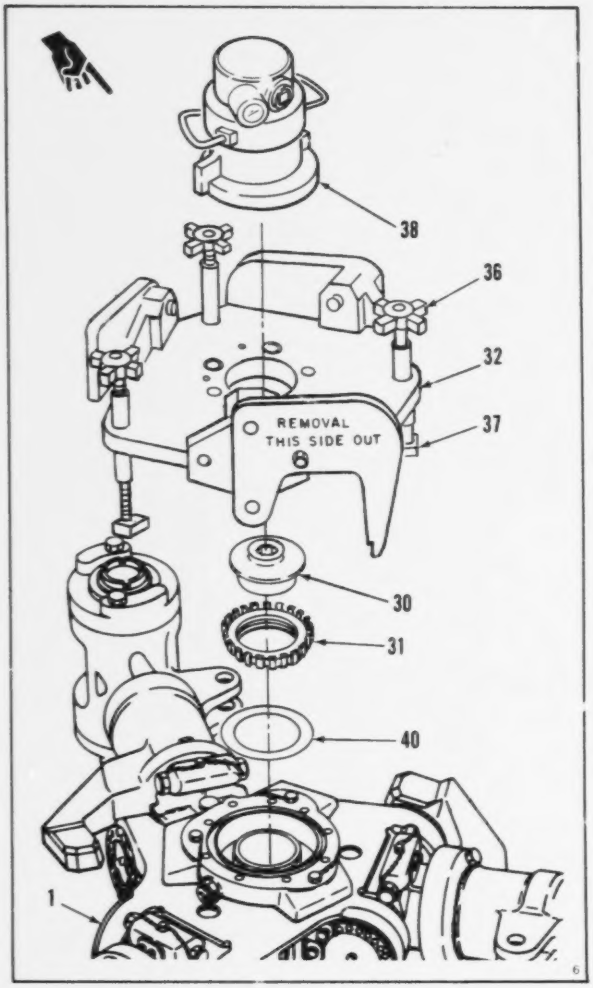
14.2. **Turn socket (30) and nut (31)** counterclockwise by hand.

NOTE

The socket can be turned using a suitable tool in the drive hole if it cannot be turned by hand.

15. **Remove socket (T29) (30).**

16. **Remove hub retaining nut (31)** and washer (40).



LIFT HEAD

17. **Prepare** rotor-head **lifting device (T30) (41)** as follows:

   a. Remove three pins (42).

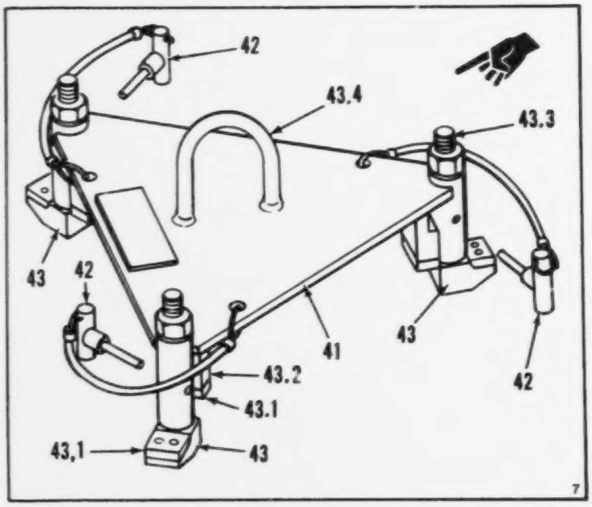
   b. Turn support arms (43) outward.

   c. Check that there is a phenolic pad (43.1) on the shoulder of each support arm (43) and on the underside of each block (43.2).

   d. Check that the distance between centers of the threaded shaft (43.3) of each support arm (43) is not more than 15.25 inches.

   e. Check that shoulder and threaded shaft of each support arm (43) is an integral assembly, not welded together.

   f. Check that handle (43.4) is welded to both surfaces of plate (41).



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17.1. **Install lifting device (T30) (41)** as follows:

a. Position lifting device (T30) (41) on head (1).

b. Turn three arms (43) inward under top flange (43.5) of head (1). Make sure each arm points to the center of device (41) within 20 degrees. Make sure each arm engages flange (43.5) at least 1/4 inch.

c. Install three pins (42).

CAUTION

Do not use wrench to tighten nuts. Lifting device (T28) can be damaged.

d. Hand-tighten three nuts (44).

18. **Attach two rope guide lines (45)** around pitch housing (5). **Attach hoist (46)** to lifting device (T30) (41).

WARNING

Head weighs 700 pounds (1,750 pounds with blades attached) and can injure personnel if it drops. Head must be supported by hoist and moved carefully to prevent injury.

WARNING

If rotor blades are installed, use special care to prevent blades from uncontrolled swinging. Station personnel at tiedown lines of all blades. Attempting to remove head without securing blades can result in injury to personnel and damage to helicopter.

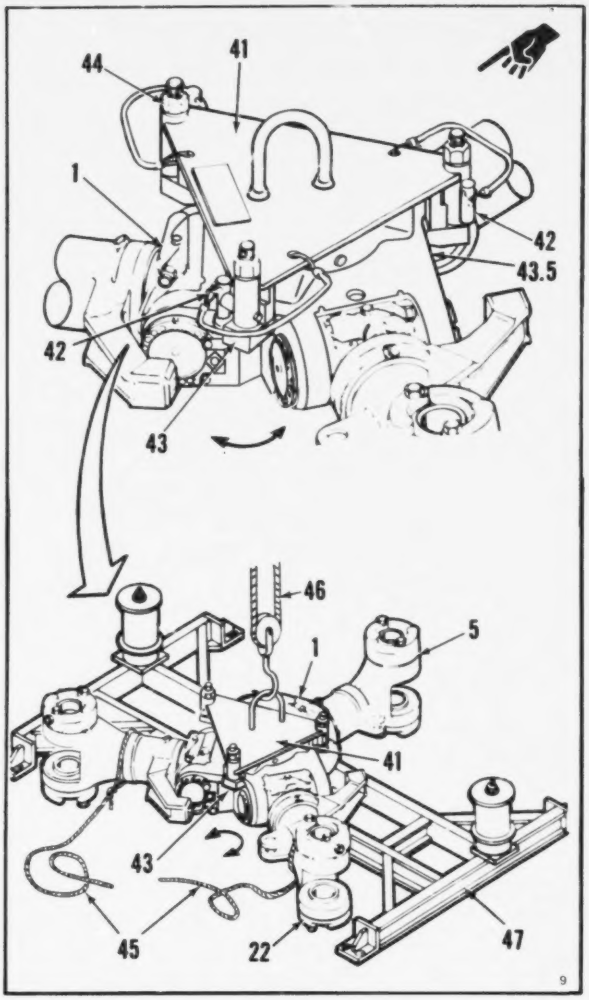
CAUTION

Lift and lower head slowly and carefully to prevent damage to splines, thread, and surfaces.

19. **Lift head (1).** Use hoist (46).

20. If rotor blades are not installed, **position head (1) on handling adapter (T13) (47).** Have helper guide head.

21. Remove three pins (42). Loosen three nuts (44) and turn three arms (43) outward. **Remove lifting device (T30) (41).**



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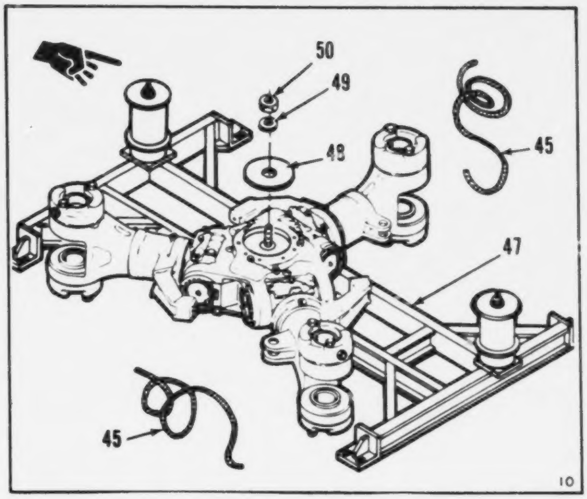
22. **Remove rope guide lines (45).**
23. **Install plate (48)**, washer (49) and locknut (50) on handling adapter (T13) (47).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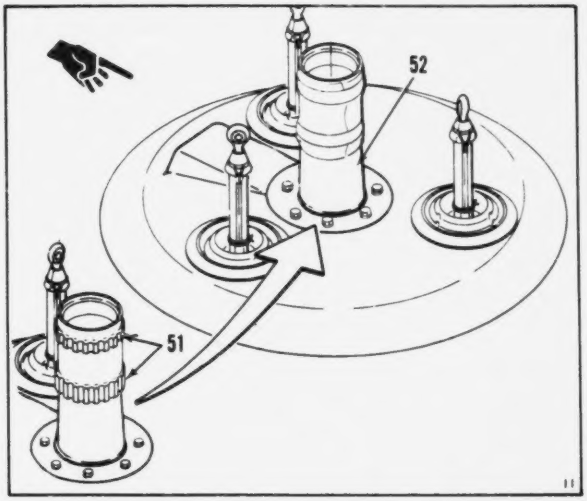
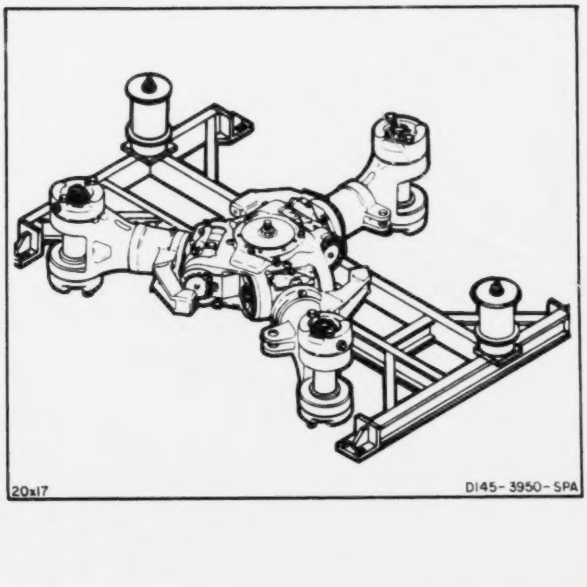
24. **Cover splines (51)** of vertical shaft (52). Use barrier material (E80) and tape (E388).



FOLLOW-ON MAINTENANCE:

None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END OF TASK

5-9 INSTALL ROTARY-WING HEAD 5-9

INITIAL SETUP

Applicable Configurations:

All

Tools:

- Aircraft Mechanic Tool Kit, NSN 5180-00-323-4692
- Rotor Head Lifting Device (T30)
- Torque Applicator (T2)
- Reaction Adapter (T28)
- Socket (T29)
- Tee Handle (T161)
- Torque Wrench, 0 to 150 Inch-Pounds
- Hoist
- Rope Guide Lines
- Depth Micrometer, 1 to 12 Inches
- Rawhide Mallet
- 1-Inch Brush

Materials:

- Grease (E190)
- Cloth (E120)
- Dry Cleaning Solvent (E162)
- Gloves (E186)

Parts:

- Packing
- Cotter Pins

Personnel Required:

- Medium Helicopter Repairer (6)
- Inspector

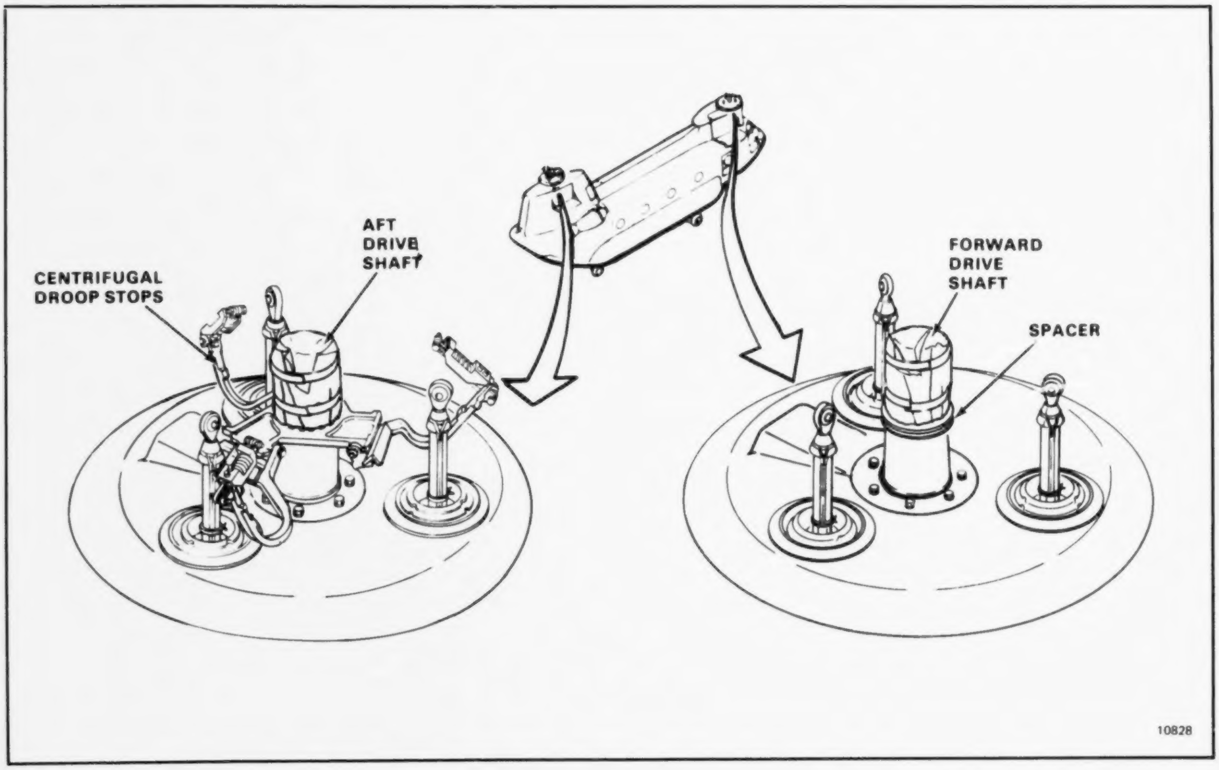
References:

- Task 5-8
- TM 55-1520-240-23P

General Safety Instructions:

CAUTION

Head, splines, and hub nut thread require a thick brush coat of grease. Seating surfaces of droop stop plate, spacer, and head must be clean and grease free. Dirty seating surfaces can cause decrease in hub nut torque. This could result in damage to head, nut, or rotor shaft.



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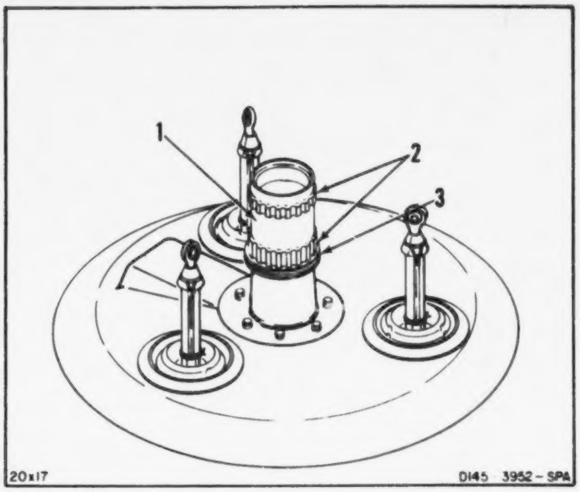
5-9 INSTALL ROTARY-WING HEAD (Continued) 5-9

WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

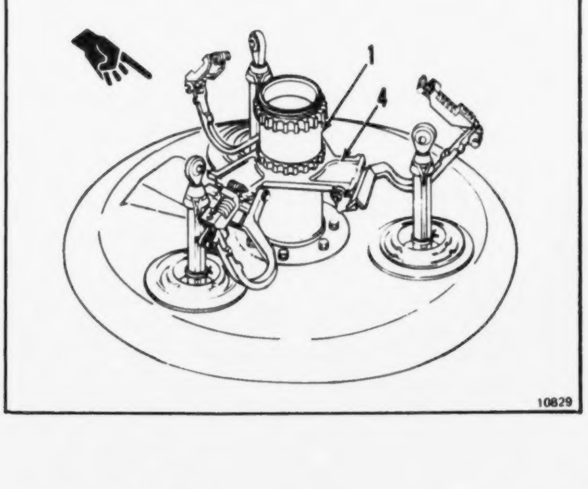


NOTE

- Procedure is similar to install rotary-wing head with or without blades attached. Installation of rotary-wing head with blades removed is shown.
- Task is similar for forward and aft rotary-wing heads. Differences are noted in text. Forward rotary-wing head can be installed with forward transmission package in workstand.

1. **Remove barrier material from driveshaft (1).** Clean splines (2). Use cloth (E120) damp with dry cleaning solvent (E162). Wear gloves (E186). Wipe splines dry. Use clean cloth (E120). Apply thick coat of grease (E190) evenly to splines. Use brush (E86).
2. Check that spacer (3) is installed on shaft (1) of forward transmission.

3. Check that centrifugal droop stop (4) is installed on shaft (1) of aft transmission.



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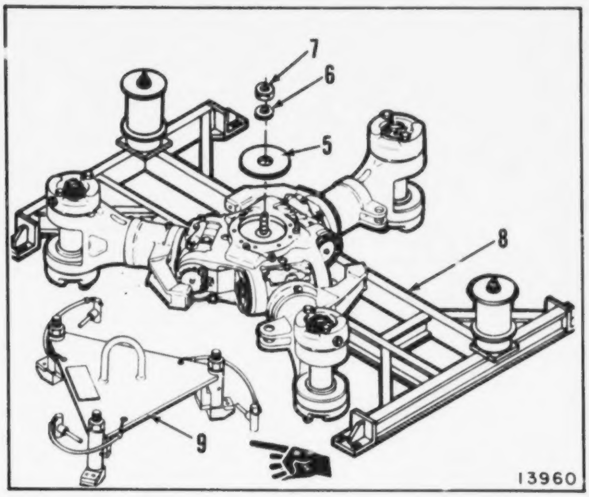
PREPARE HEAD

4. **Remove plate (5)**, washer (6), and locknut (7) from handling adapter (T13) (8).

4.1. Prepare lifting device (T30) (9) for installation (Task 5-8, step 17).

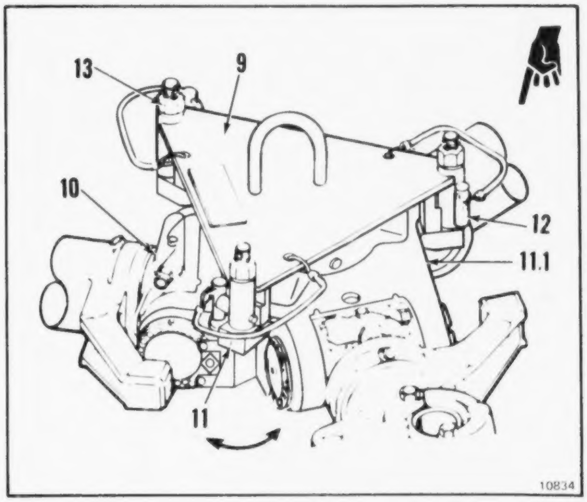


5. **Install lifting device (T30) (9)** on hub (10) as follows:
   - a. Position lifting device (9) on hub (10).
   - b. Turn three arms (11) inward under top flange (11.1) of hub (10). Make sure each arm points to the center of device (9) within 20 degrees. Make sure each arm engages flange at least 1/4 inch.
   - c. Install three pins (12).

CAUTION

Do not use wrench to tighten nuts. Lifting device (T30) can be damaged.

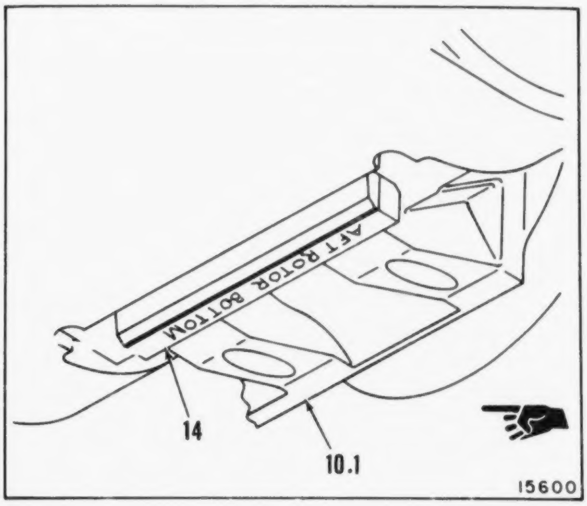
   - d. Hand-tighten three nuts (13).



NOTE

Fixed droop stops are marked FWD ROTOR BOTTOM or AFT ROTOR BOTTOM.

6. **Check that correct fixed droop stops (14) are installed on pitch shaft (10.1) in three places. Check that droop stops are installed with bottom side down as marked.**



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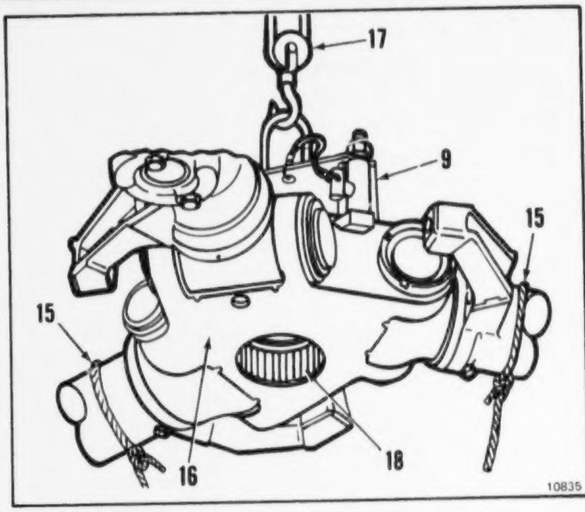
5-9 INSTALL ROTARY-WING HEAD (Continued)

7. Attach two rope guidelines (15) to rotary-wing head (16). Attach hoist (17) to lifting device (T30) (9).



WARNING

Head weighs 700 pounds (1,750 pounds with blades attached) and can injure personnel if it drops. Head must be supported by hoist and moved carefully to prevent injury.

WARNING

If rotor blades are installed, use special care to prevent blades from uncontrolled swinging. Station personnel at tiedown lines of all blades. Attempting to install head without securing blades can result in injury to personnel and damage to helicopter.

CAUTION

Lift and lower head slowly and carefully to prevent damage to splines, thread, and surfaces.

NOTE

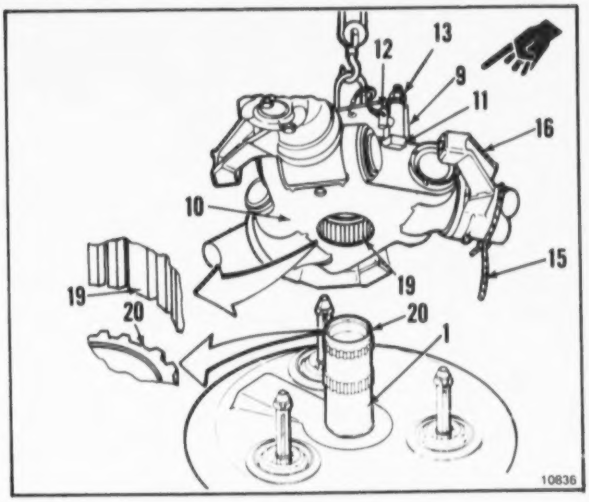
Grease on shaft splines will be pushed down by head onto seating surfaces.

INSTALL HEAD

8. **Lift head (16).** Use hoist (17). Clean splines (18). Use cloth (E120) damp with solvent (E162). Wipe dry. Use clean cloth (E120). Reach under head and **apply thick coat of grease (E190) evenly to splines (18). Use a 1-inch brush.** Make sure lower surface of head is free of grease. Wear gloves (E186).

GO TO NEXT PAGE

5-9 INSTALL ROTARY-WING HEAD (Continued) 5-9



CAUTION

Move head slowly when positioning head on shaft. Misalignment can damage head or shaft. Use care to avoid pitch links.

9. **Have helper position head (16)** over drive shaft (1). Align master spline (19) of head with master spline (20) of shaft.
10. **Lower head (16) onto shaft (1)** until hub (10) is seated. Remove excess grease from top and bottom of hub. Use cloths (E120).
11. Remove lifting device (T30) (9) as follows:
    a. Loosen three nuts (13) and remove three pins (12).
    b. Turn three arms (11) outward.
    c. Remove lifting device (T30) (9).

11.1. Remove ropes (15).

GO TO NEXT PAGE

12. Deleted.
13. Deleted.

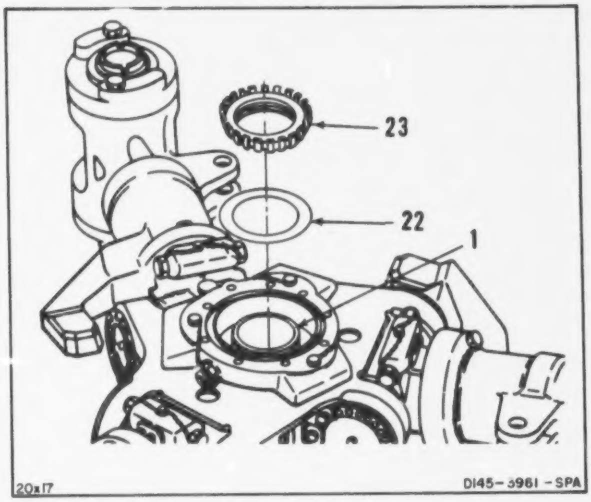
INSTALL RETAINING NUT

14. **Install washer (22)** on shaft (1).
15. **Check thread of hub nut (23)** for damaged thread.
16. Apply thinnest possible coat of grease (E190) evenly to thread of nut (23) and exposed thread of shaft (1). Use a 1-inch brush. Wipe excess grease from thread. Use cloth and hand pressure.

CAUTION

Use of tools to seat nut may cross threads.

17. **Install nut (23)** on shaft (1). Use hand pressure only.



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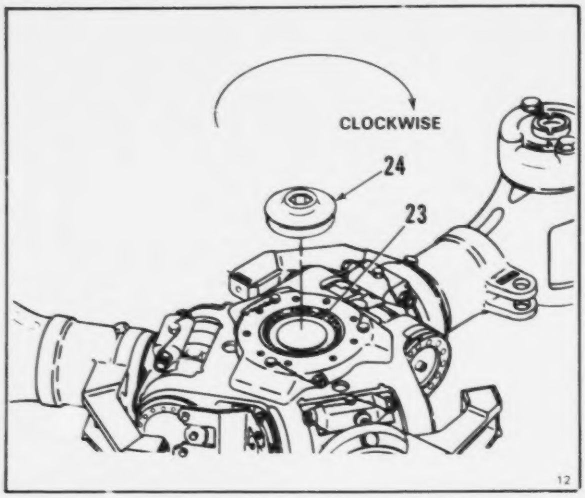
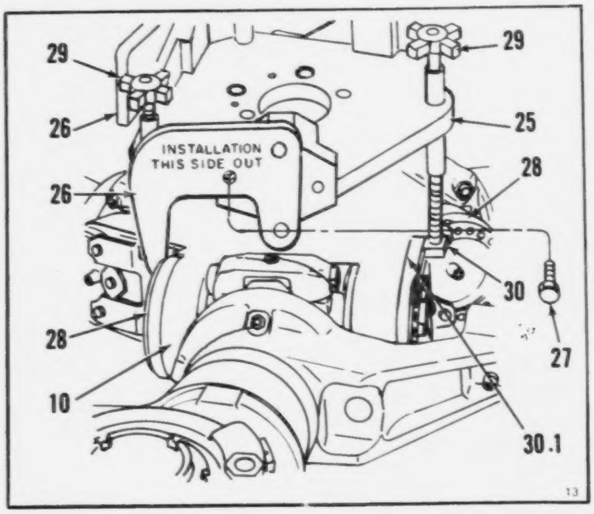
18. **When nut (23) is fully seated, install socket (T29) (24) on nut (23).** Turn nut clockwise hand-tight.



NOTE

Speed handle may be used to tighten nut until torque begins to increase.



NOTE

For forward head, install adapter with marking FWD ROTOR THIS SIDE UP on top. For aft head, install adapter with marking AFT ROTOR THIS SIDE UP on top.

19. **Install reaction adapter (T28) (25)** as follows:

    a. Secure three reaction hooks (26) to adapter (T28) (25) with INSTALLATION side out. Use bolts (27).

    b. Position adapter (T28) (25) on top of hub (10), with reaction hooks (26) against caps (28) and with handwheels (29) on top.

CAUTION

Do not overtighten handwheels; otherwise, damage to rotor hub or adapter can occur.

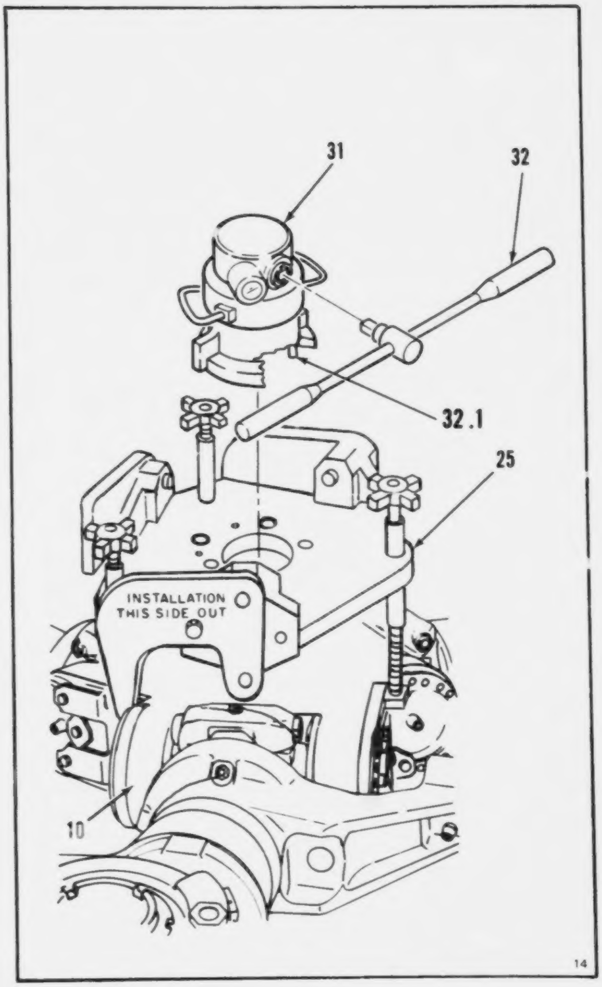
    c. Position three clamps (30) under top flange (30.1) of hub (10). Tighten handwheels (29).

GO TO NEXT PAGE

NOTE

Pins under torque applicator must be fully seated in reaction adapter (T28) to prevent applicator ride-up when torque is first applied.

20. **Position torque applicator (T2) (31) on reaction adapter (T28) (25).** Turn tee handle (T161) (32) to rotate applicator to engage reaction pins (32.1) in adapter.


31
32
32.1
25
INSTALLATION THIS SIDE OUT
10
14

GO TO NEXT PAGE

5-9 INSTALL ROTARY-WING HEAD (Continued) 5-9

WARNING

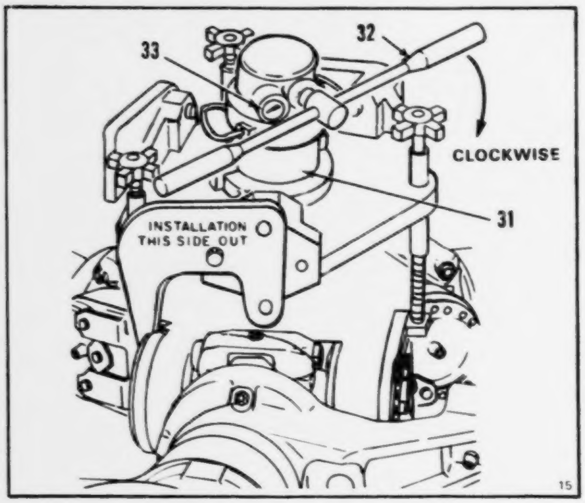
Torque must be applied to hub nut as described. Wrong torque can result in loss of helicopter and loss of life.

CAUTION

Do not use power tools to turn torque applicator. Applicator could be severely damaged.

NOTE

Gage on torque applicator (T2) is direct reading and shows actual torque applied to nut. Allowable torque range for tang washer alignment is **5500 to 6000 foot-pounds.**



21. Have helper **turn handle (T161) (32) clockwise.** Observe gage (33) on torque applicator (T2) (31). **Turn handle until gage indicates 5500 to 6000 foot-pounds. Apply torque slowly as gage reading approaches 5500 foot-pounds.**

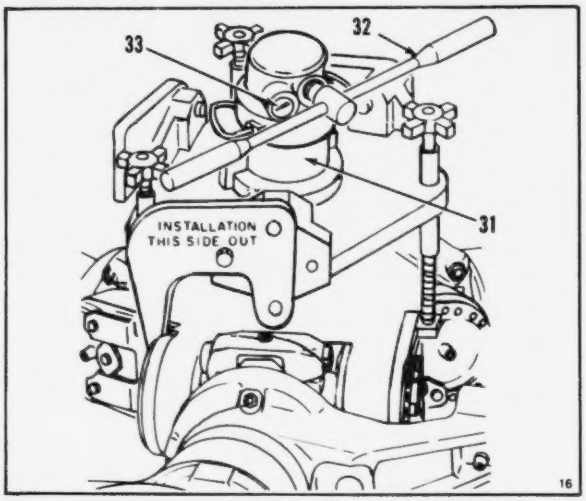
GO TO NEXT PAGE

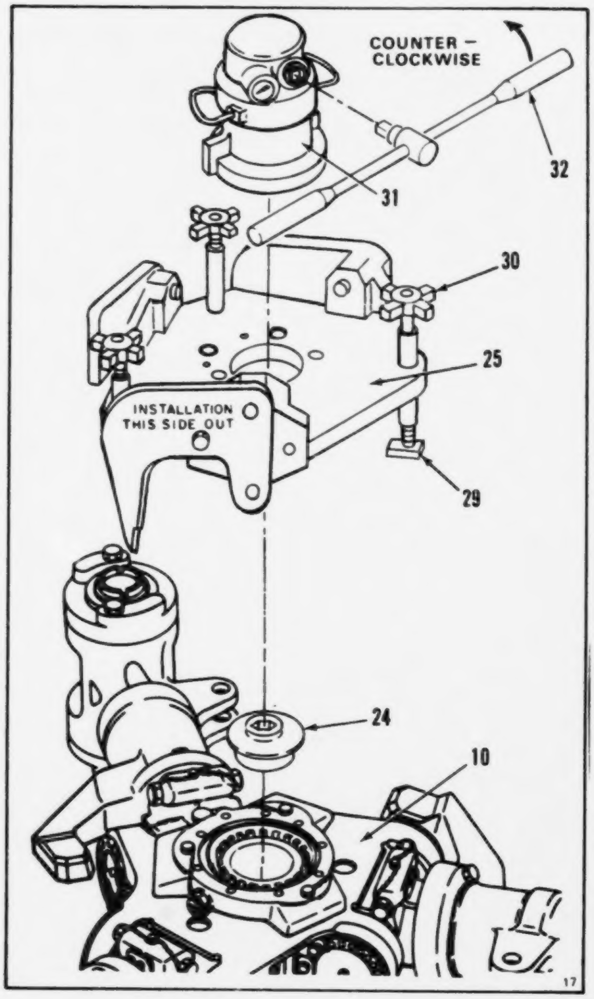
5-9 INSTALL ROTARY-WING HEAD (Continued) 5-9

WARNING

If handle is turned past an indication of 0 foot-pounds, torque on hub nut may be reduced. Loss of helicopter and loss of life may result.

22. Have helper **turn handle (T161) (32) counterclockwise until gage (33) on torque applicator (T2) (31) indicates 0 foot-pounds.**
23. Try to rock applicator (T2) (31). If applicator rocks, go to step 24. If applicator cannot be moved, continue to turn handle (32) until torque is relieved.
24. **Remove handle (T161) (32) and torque applicator (T2) (31).**
25. **Remove reaction adapter (T28) (25)** as follows:
    a. Loosen three handwheels (30).
    b. Turn clamps (29) outward.
    c. Lift reaction adapter (25) from hub (10).
26. **Remove socket (T29) (24).**


33
32
31
INSTALLATION THIS SIDE OUT
16


COUNTER – CLOCKWISE
32
31
30
25
INSTALLATION THIS SIDE OUT
29
24
10
17

GO TO NEXT PAGE

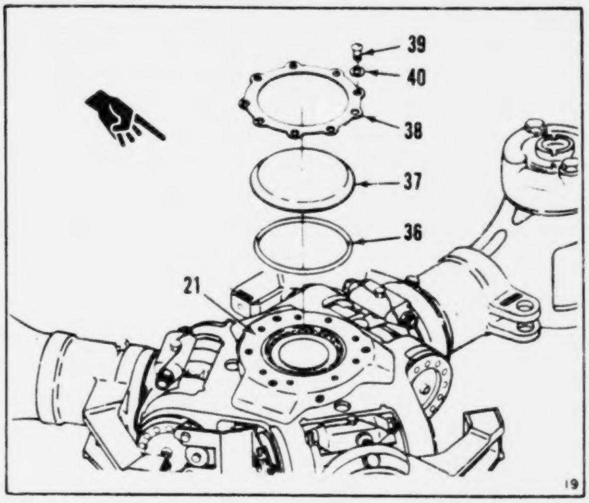
5-9 INSTALL ROTARY-WING HEAD (Continued) 5-9

27. **Install tang washer (34)** on nut (23).

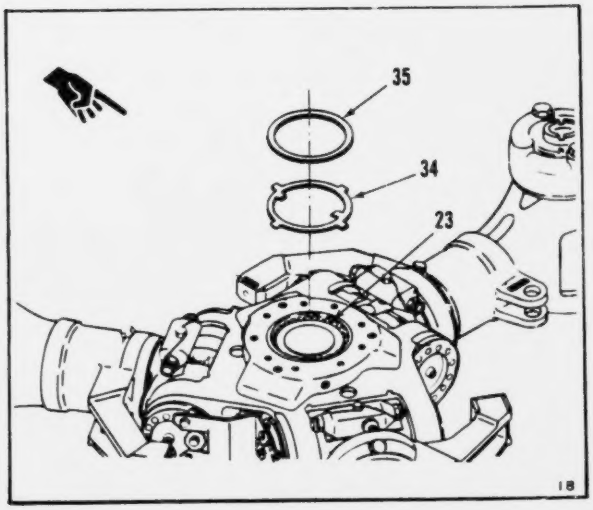
WARNING

Do not file tang washer to make it fit. Filing can cause tangs to break causing loss of helicopter and loss of life.

28. **If tang washer (34) cannot be seated** in any position, repeat steps 12 through 27. **Increase torque** up to **5750 foot-pounds** to permit washer to be seated.
29. If tang washer (34) cannot be seated in any position, repeat steps 12 through 27 and increase torque to **6000 foot-pounds** . If tang washer still will not seat, try **5600 foot-pounds** and other in-between torque readings.
30. **Install retaining ring (35)** in groove of nut (23).



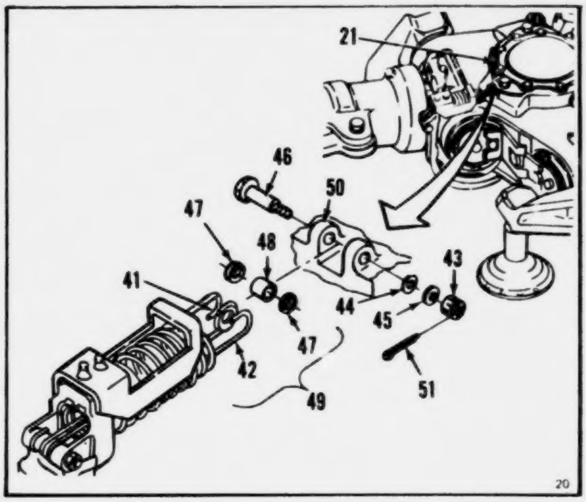
INSPECT



31. **Install packing (36)** on hub oil tank (21).
32. **Position cover (37)** on hub oil tank (21).
33. **Position retainer (38)** on cover (37). **Install nine screws (39)** and washers (40). **Torque screws to 23 inch-pounds.**

GO TO NEXT PAGE

34. **On aft hub oil tank (21) only, connect each of three droop stop springs (41) and limiter springs (42)** as follows:
    a. Remove nut (43), washers (44 and 45) and bolt (46).
    b. Check that spring (41), limiter spring (42), special washers (47), and bearing (48) are assembled as shown.
    c. Install assembly (49) between lugs (50).
    d. Install bolt (46), nut (43), and cotter pin (51). Install washers (44 and 45), if required, to align cotter pin.

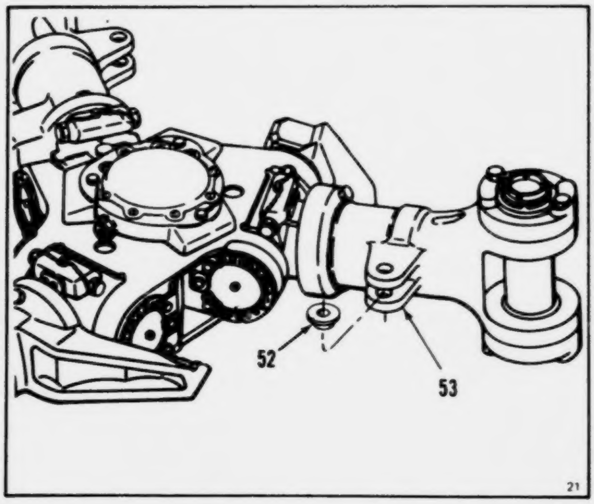


CAUTION

Have qualified inspector verify that bushings (52) are installed. Damage to rotor head/pitch varying housing will result if bushings are left out of lower lugs.

35. Install sliding bushings (52) in each of three lower lugs (53).

INSPECT



FOLLOW-ON MAINTENANCE:

Attach pitch links to pitch housings (Task 5-99). Remove pitch lock pins (T22) if blades were attached (Task 5-96.2).

Check vertical pin angles (Task 11-55).

Install rotary-wing blades if blades were not attached (Task 5-84).

Install droop stop shrouds on aft head, if required (Task 5-48.5).

END OF TASK

5-9.1 ROTARY-WING HEAD RETAINING NUT TORQUE CHECK 5-9.1

INITIAL SETUP

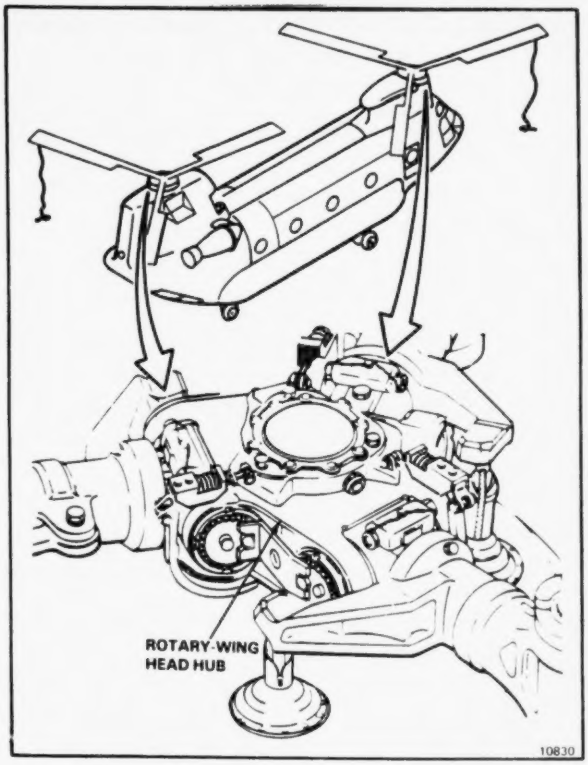
Applicable Configurations:
ALL

Tools:
Aircraft Mechanic Tool Kit, NSN 5180-00-323-4692
Torque Applicator (T2)
Reaction Adapter (T28)
Socket (T29)
Tee Handle (T161)
Torque Wrench, 5 to 50 Inch-Pounds

Materials:
None

Personnel Required:
Medium Helicopter Repairer (3)
Inspector

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Forward and Aft Work Platforms Open (Task 2-2)
Tiedown Lines Installed on One Forward and One Aft Blade (Task 1-26)



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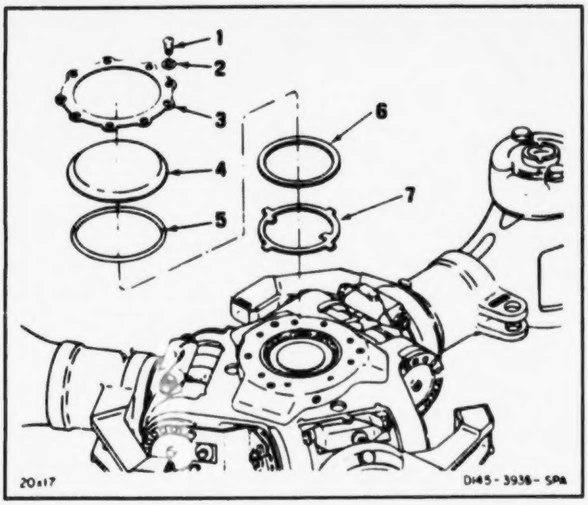
5-9.1 ROTARY-WING HEAD RETAINING NUT TORQUE CHECK (Continued) 5-9.1

WARNING

Rotary wing blades can seriously injure personnel. Make sure area around helicopter is clear of personnel before moving blades.

CAUTION

To prevent dropping and damaging rotor head, use two men when installing reaction adapter.



NOTE

- The retaining nut torque must be checked following the first flight after rotary-wing head installation.
- Procedure is same for forward or aft rotary-wing heads.

1. Check cockpit controls to ensure thrust control is in the 3° detent position.
2. Remove nine screws (1) and washers (2).
3. **Remove** retainer (3), **cover (4)** and packing (5).
4. Remove retaining ring (6) and tang washer (7).

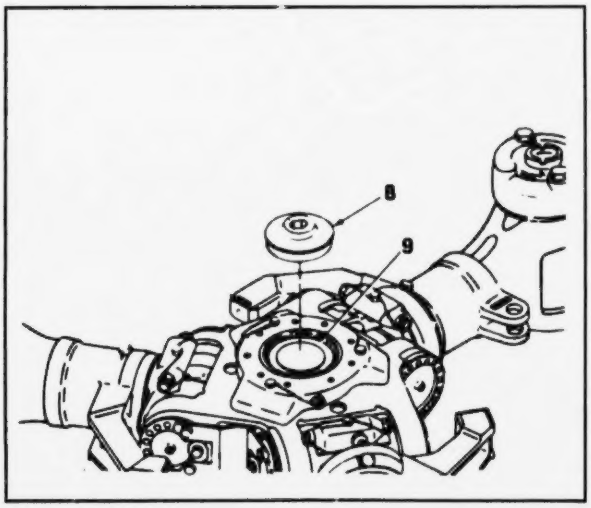
NOTE

Use grease pencil to mark a line on nut (9) and socket (8).

5. **Position socket (T29) (8) on hub retaining nut (9).**

NOTE

For forward head, install adapter with marking FWD ROTOR THIS SIDE UP on top. For aft head, install adapter with marking AFT ROTOR THIS SIDE UP on top.



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5-9.1 ROTARY-WING HEAD RETAINING NUT TORQUE CHECK (Continued) 5-9.1

6. **Install reaction adapter (T28) (10)** as follows:

   a. Secure three reaction hooks (11) to adapter (T28) (10) with INSTALLATION side out. Use bolts (12).

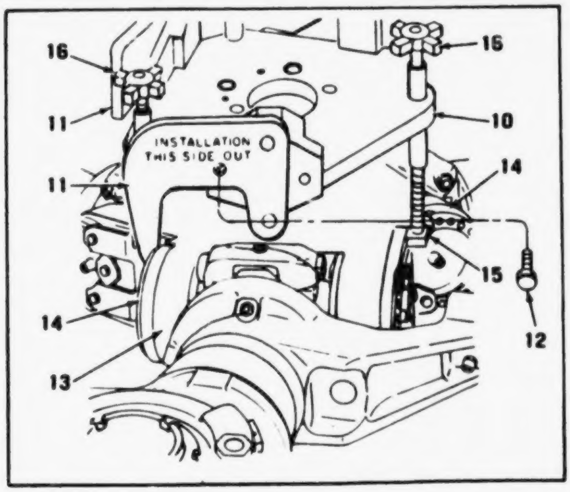
   b. Position adapter (T28) (10) on top of hub (13), with reaction hooks (11) against caps (14).

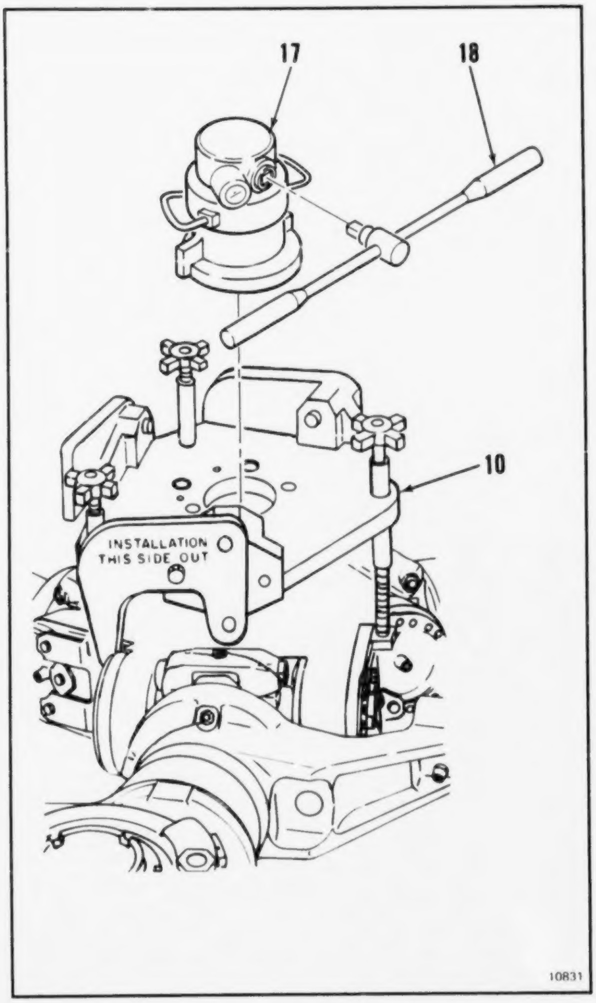
   CAUTION

   Do not overtighten handwheels; otherwise, damage to component can occur.

   c. Position three clamps (15) under top flange of hub (13). Tighten handwheels (16).

7. **Position torque applicator (T2) (17) on reaction adapter (T28) (10).** Rotate applicator until it is seated against adapter. Turn tee handle (T161) (18) to rotate applicator until it is fully seated.


16
16
11
10
INSTALLATION THIS SIDE OUT
11
14
15
14
12
13


17
18
10
INSTALLATION THIS SIDE OUT
10831

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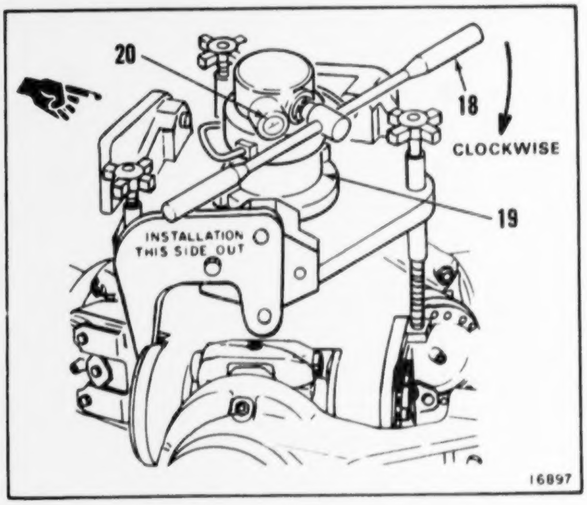
5-9.1 ROTARY-WING HEAD RETAINING NUT TORQUE CHECK (Continued) 5-9.1



WARNING

Torque must be applied to hub nut as described. Wrong torque can result in loss of helicopter and loss of life.

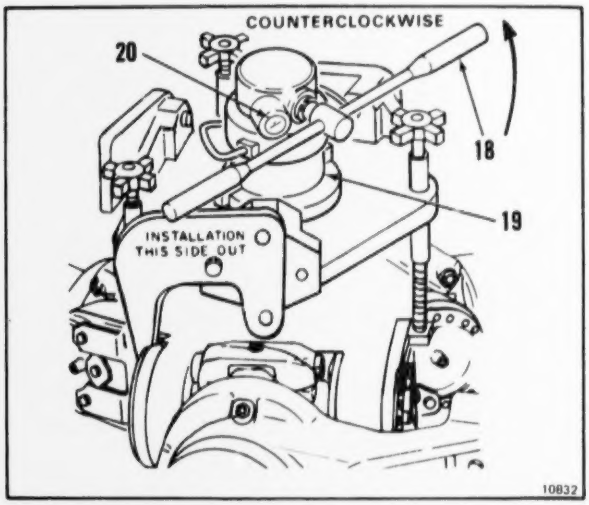
CAUTION

Do not use power tools to turn torque applicator. Applicator could be severely damaged.

NOTE

Gage on torque applicator (T2) is direct reading and shows actual torque applied to nut. Allowable torque range for tang washer alignment is **5500 to 6000 foot-pounds.**

8. Have helper **turn handle (T161) (18) clockwise.** Observe gage (20) on torque applicator (T2) (19). **Turn handle until gage indicates 5500 to 6000 foot-pounds. Apply torque slowly as gage reading approaches 5500 foot-pounds.**



WARNING

If handle is turned past indication of 0 foot-pounds, torque on hub nut may be reduced. Loss of helicopter and loss of life can result.

9. Have helper **turn handle (18) counterclockwise until gage (20) on torque applicator (T2) (19) indicates 0 foot-pounds.** Do not continue turning handle.
10. Try to rock applicator (T2) (19). If applicator rocks, go to step 11. If applicator cannot be moved, continue to turn handle (T161) (18) until torque forces are relieved.

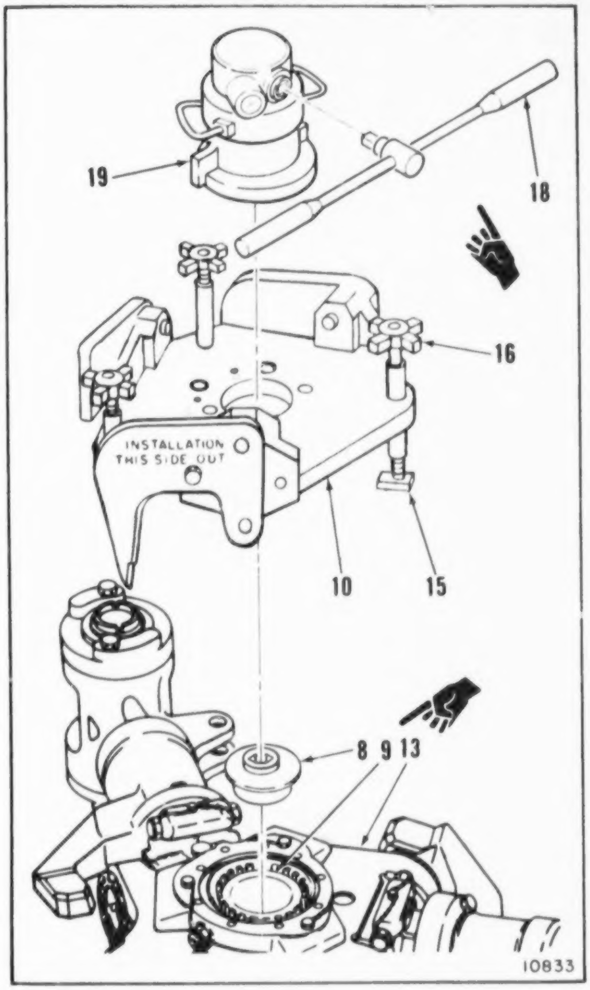
GO TO NEXT PAGE

5-9.1 ROTARY-WING HEAD RETAINING NUT TORQUE CHECK (Continued) 5-9.1

11. **Remove handle (T161) (18) and torque applicator (T2) (19).**
12. **Remove reaction adapter (T28) (10)** as follows:
    - a. Loosen three handwheels (16).
    - b. Turn clamps (15) outward.
    - c. Lift reaction adapter (10) from hub (13).
13. **Remove socket (T29) (8).**
14. Check nut (9) for movement. If nut did not move during torque check, go to step 15. **If nut (9) moved, make an entry in the helicopter log book that nut (9) must be checked following the next flight.**

NOTE

If at the subsequent recheck, the nut again turns at the minimum torque, remove the rotary-wing head and inspect for contamination, incorrect installation, or defective components.



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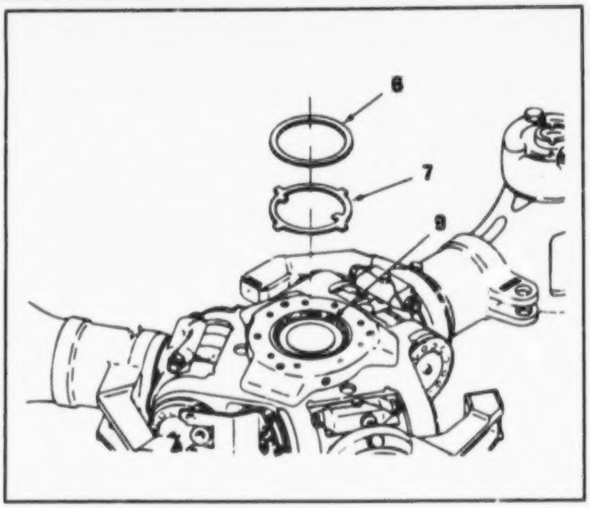
5-9.1 ROTARY-WING HEAD RETAINING NUT TORQUE CHECK (Continued) 5-9.1



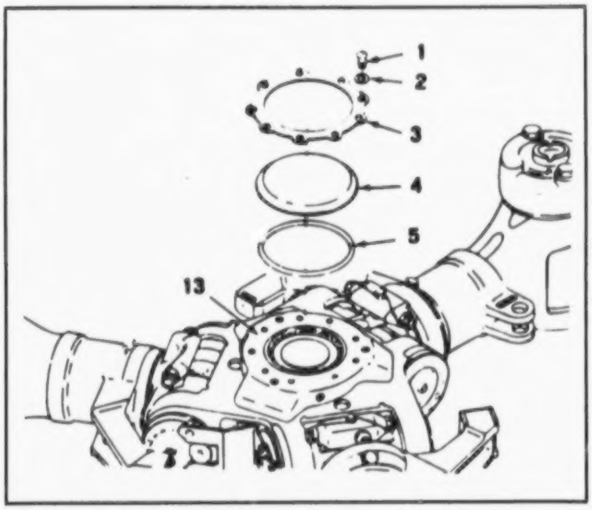
15. **Install tang washer (7)** on nut (9).

WARNING

Do not file tang washer to make it fit. Filing can cause tangs to break causing loss of helicopter and loss of life.

16. **If nut (9) moved during torque check and tang washer (7) cannot be seated in any position, repeat steps 8 through 15. Increase/vary torque upward accordingly, not to exceed 6000 foot-pounds** to seat tang washer (7).
17. **Install retaining ring (6)** in groove of nut (9).

INSPECT



18. **Install packing (5)** on hub oil tank (13).
19. **Position cover (4)** on hub oil tank (13).
20. **Position retainer (3)** on cover (4). **Install nine screws (1)** and washers (2). **Torque screws to 23 inch-pounds.**

INSPECT

FOLLOW-ON MAINTENANCE:

Close forward or aft work platforms (Task 2-2).

Remove tiedown lines from forward and aft blades.

END OF TASK

5-10 REMOVE HUB OIL TANK SIGHT INDICATOR 5-10

INITIAL SETUP

Applicable Configurations:
All

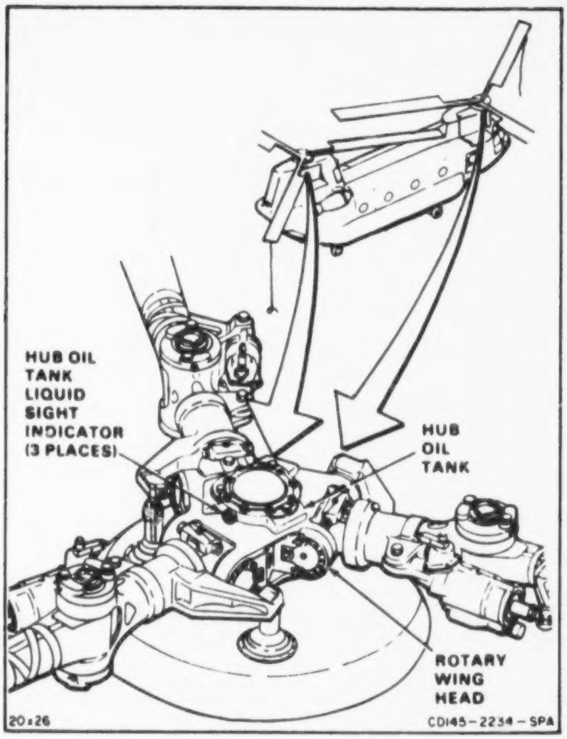
Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Container, Two Quart

Materials:
Lockwire (E231)

Parts:
Packing

Personnel Required:
Medium Helicopter Repairer

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)
Forward or Aft Work Platform Open (Task 2-2)


HUB OIL TANK LIQUID SIGHT INDICATOR (3 PLACES)
HUB OIL TANK
ROTARY WING HEAD
20x26
CD145-2234-SPA

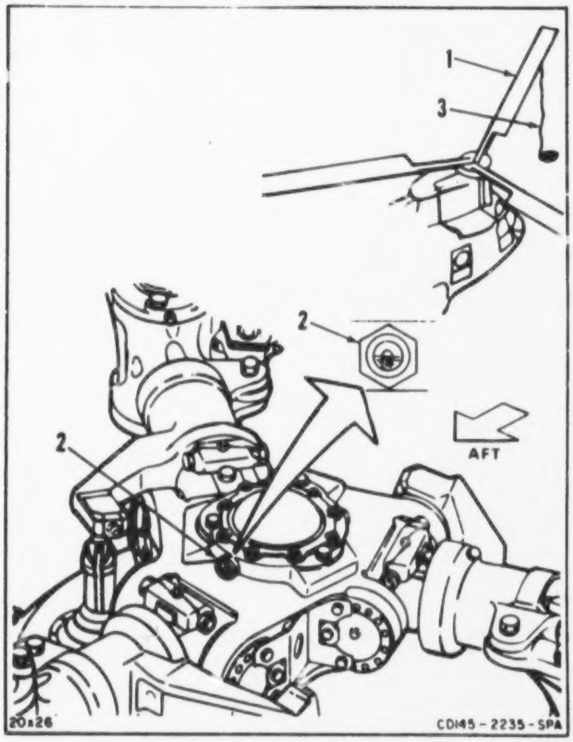
WARNING

Rotor blades can seriously injure personnel. Make sure area around helicopter is clear of personnel before moving rotor blades.

NOTE

Procedures are same for removing any hub oil tank sight indicator.

1. Turn rotor blades (1) until sight indicator (2) to be removed faces aft. Use tiedown line (3) to turn blades.


1
3
2
2
AFT
20x26
CD145-2235-SPA

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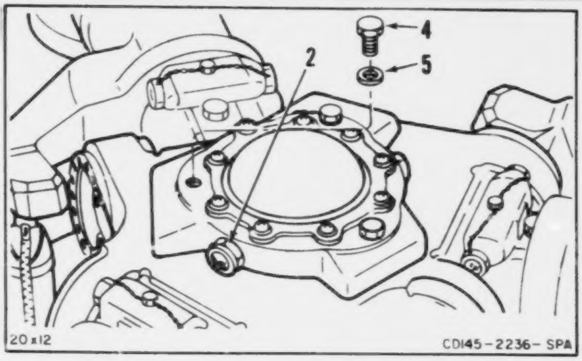
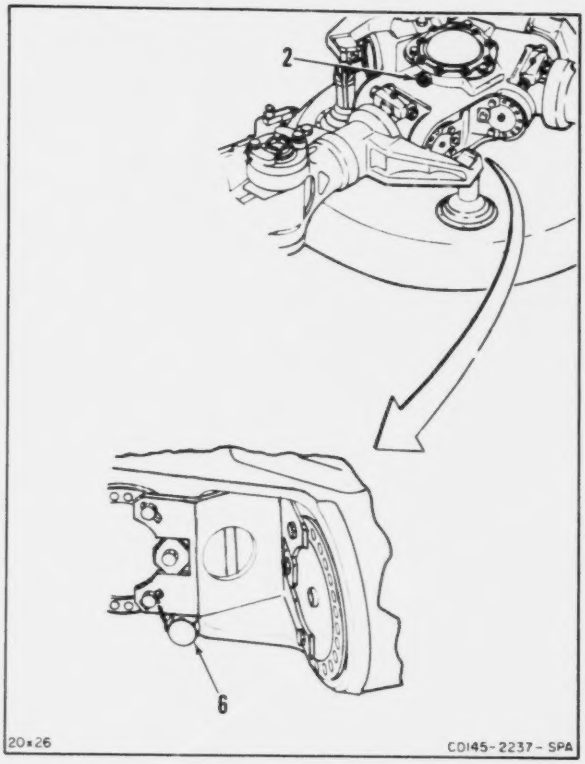
5-10 REMOVE HUB OIL TANK SIGHT INDICATOR (Continued) 5-10

2. Remove lockwire between filler plug (4) and sight indicator (2). **Remove filler plug** and packing (5).


4
5
2
20x12
CD145-2236-SPA

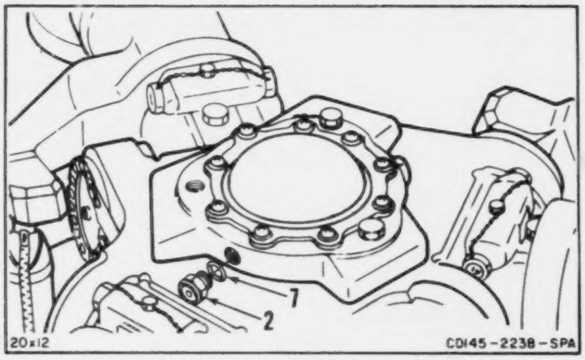
3. Remove lockwire from aft drain plug (6). Loosen plug and **drain oil until oil level is below sight indicator (2).** Use container for oil.
4. Tighten and lockwire drain plug (6). Use lockwire (E231).


2
6
20x26
CD145-2237-SPA

CAUTION

Do not turn rotors with sight indicator removed. Turning rotors will cause oil to spill from open port.

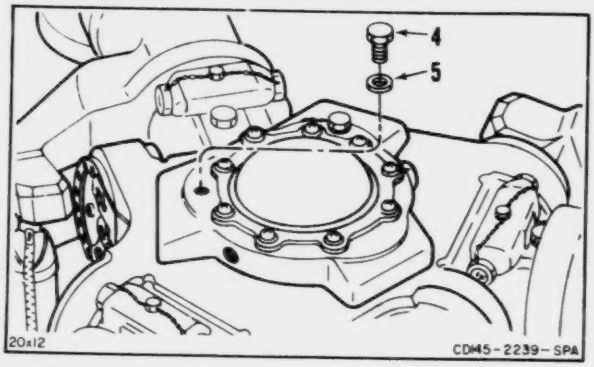
5. **Remove sight indicator (2)** and packing (7).


7
2
20x12
CD145-2238-SPA

GO TO NEXT PAGE

5-10 REMOVE HUB OIL TANK SIGHT INDICATOR (Continued) 5-10

6. **Install filler plug (4)** and packing (5). Do not torque plug at this time.


4
5
20x12
CDM5-2239-SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-11 INSTALL HUB OIL TANK SIGHT INDICATOR 5-11

INITIAL SETUP

Applicable Configurations:
All

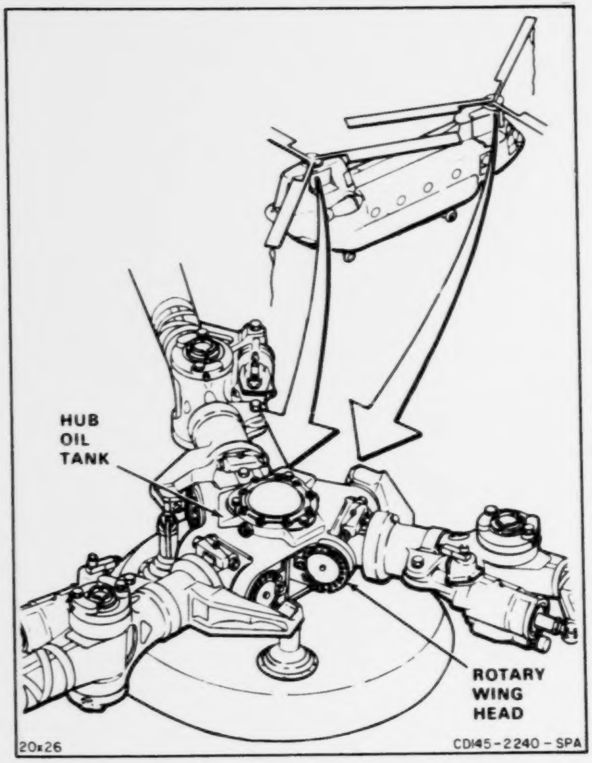
Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Torque Wrench, 30 to 150 Inch-Pounds

Materials:
Lubricating Oil (E254)

Parts:
Packing

Personnel Required:
67U10 Medium Helicopter Repairer
67U30 Inspector

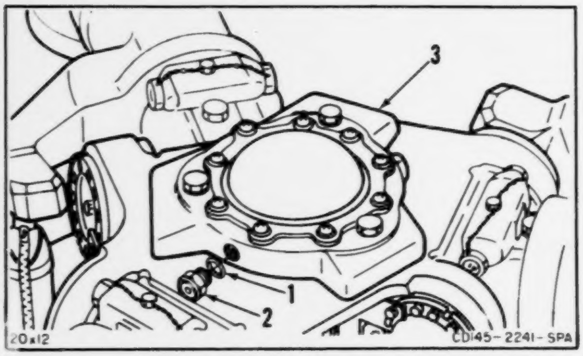
References:
TM 55-1520-240-23P


HUB OIL TANK
ROTARY WING HEAD
20x26
CD145-2240 - SPA

NOTE

Procedures are same for installing any hub oil tank sight indicator.

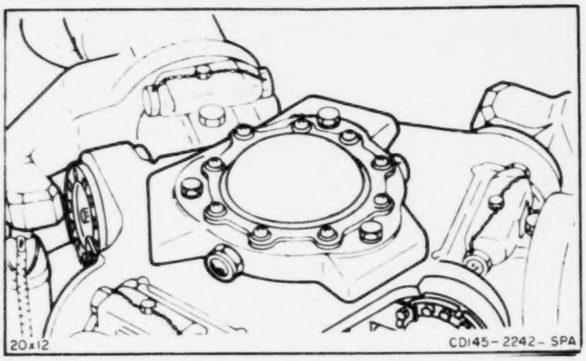
1. Lubricate packing (1). Use lubricating oil (E254). Install packing (1) on sight indicator (2).
2. **Install indicator (2)** in hub oil tank (3). **Torque indicator to 115 inch-pounds. Do not lockwire at this time.**


3
1
2
20x12
CD145-2241- SPA

GO TO NEXT PAGE

5-11 INSTALL HUB OIL TANK SIGHT INDICATOR (Continued) 5-11

INSPECT


20x12
CD145-2242-SPA

FOLLOW-ON MAINTENANCE:

Service hub oil tank (Task 1-55).

END OF TASK

5-12 REMOVE PITCH HOUSING OIL TANK SIGHT INDICATOR 5-12

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Container, Two Quart

Materials:

Lockwire (E231)

Parts:

Packing

Personnel Required:

67U10 Medium Helicopter Repairer

Equipment Condition:

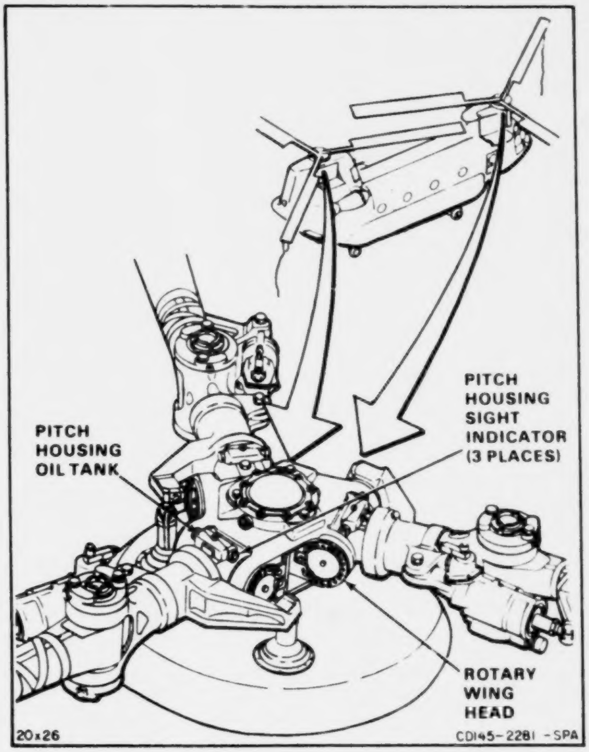
Battery Disconnected (Task 1-39)

Electrical Power Off

Hydraulic Power Off

Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)

Forward or Aft Work Platform Open (Task 2-2)


PITCH HOUSING SIGHT INDICATOR (3 PLACES)
PITCH HOUSING OIL TANK
ROTARY WING HEAD
20x26
CDI45-2281-SPA

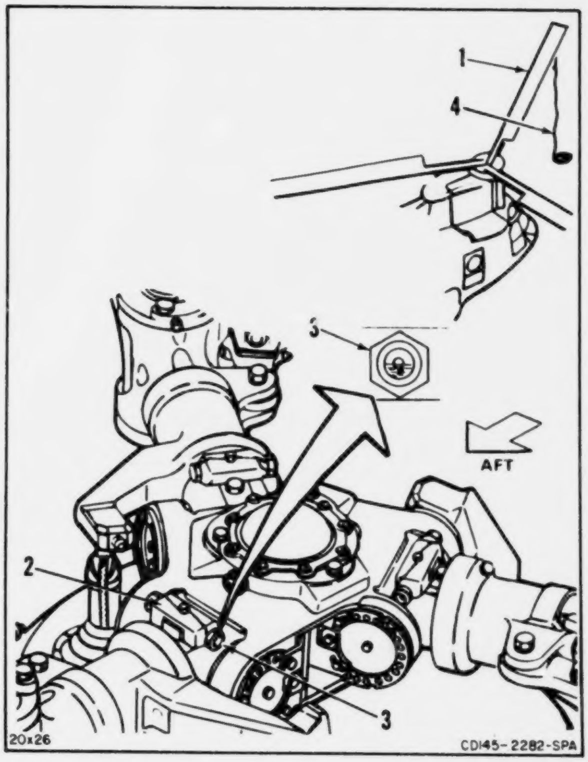
WARNING

Rotor blades can seriously injure personnel. Make sure area around helicopter is clear of personnel before moving rotor blades.

NOTE

Procedures are same for removing any pitch housing oil tank sight indicator.

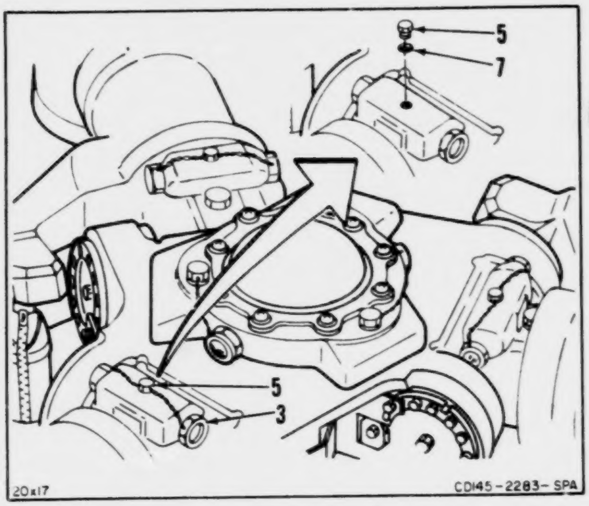
1. Turn rotor blades (1) until tank (2) with sight indicator (3) to be removed, is within reach. Use tiedown line (4) to turn blades.


1
4
3
AFT
2
3
20x26
CDI45-2282-SPA

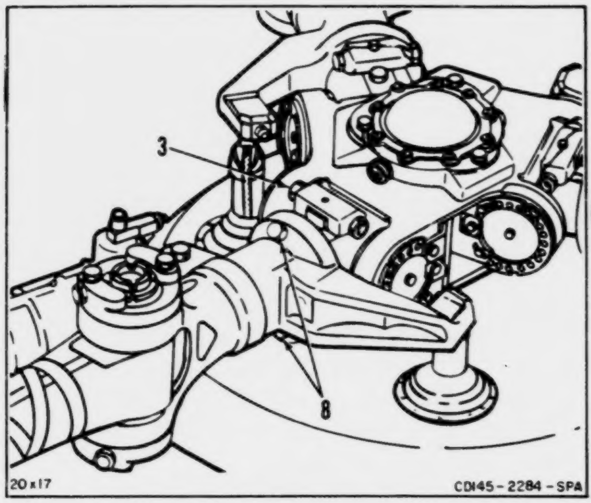
GO TO NEXT PAGE

5-12 REMOVE PITCH HOUSING OIL TANK SIGHT INDICATOR (Continued) 5-12

2. Remove lockwire between filler plug (5) and sight indicators (3). **Remove filler plug** and packing (7).


5
7
5
3
20x17
CD145-2283-SPA

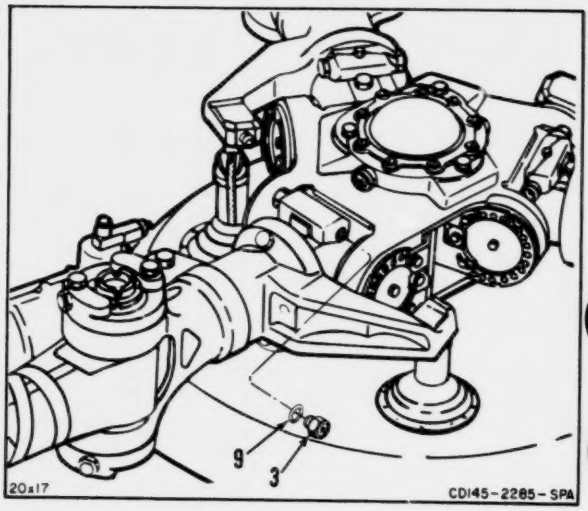
3. Remove lockwire from two plugs (8). Loosen plugs and drain oil **until oil level is below sight indicator (3).** Tighten plugs. Lockwire plugs together. Use lockwire (E231).


3
8
20x17
CD145-2284-SPA

CAUTION

Do not turn rotors with sight indicator removed. Turning rotors with cause oil to spill from open port.

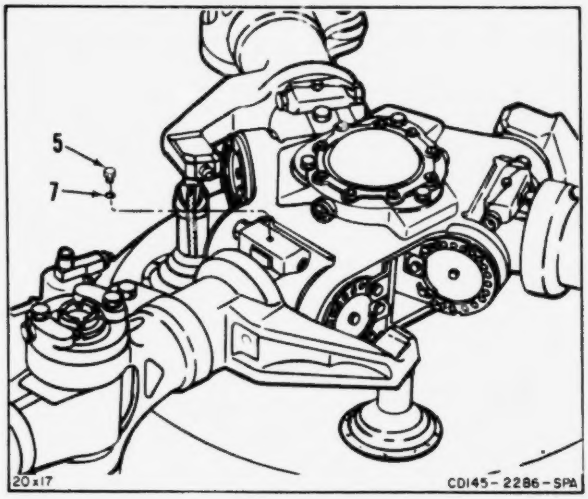
4. **Remove sight indicator (3)** and packing (9).


9
3
20x17
CD145-2285-SPA

GO TO NEXT PAGE

5-12 REMOVE PITCH HOUSING OIL TANK SIGHT INDICATOR (Continued) 5-12

5. **Install filler plug (5)** and packing (7). Do not lockwire plug at this time.


5
7
20x17
CD145-2286-SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-13 INSTALL PITCH HOUSING OIL TANK SIGHT INDICATOR 5-13

INITIAL SETUP

Applicable Configurations:
All

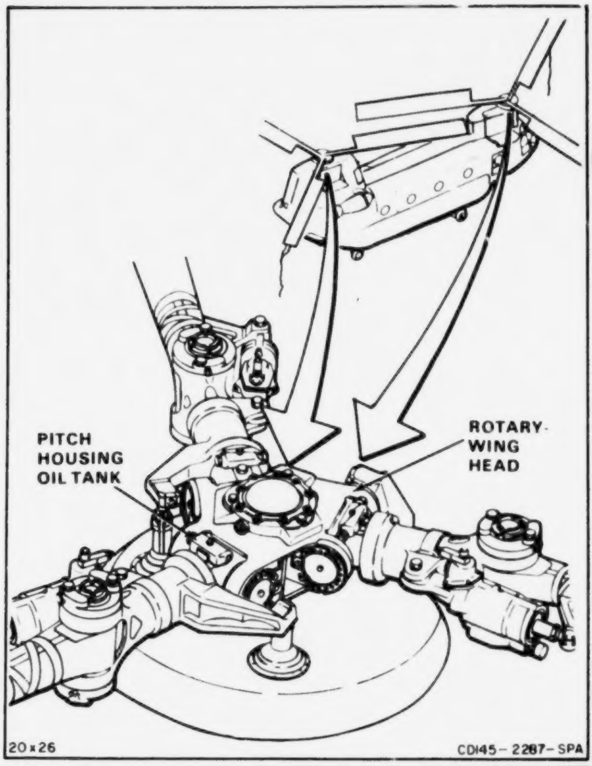
Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Torque Wrench, 30 to 150 Inch-Pounds

Materials:
Lubricating Oil (E254)

Parts.
Packing

Personnel Required:
Medium Helicopter Repairer
Inspector

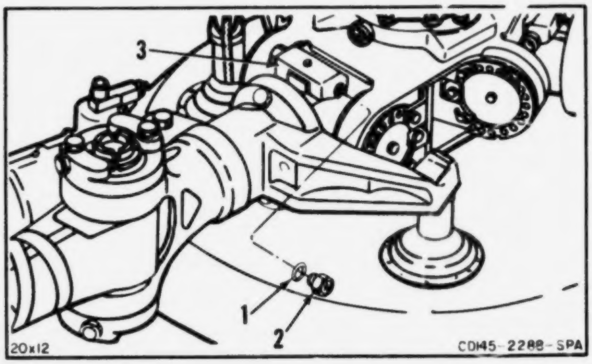
References:
TM 55-1520-240-23P


PITCH
HOUSING
OIL TANK
ROTARY-
WING
HEAD
20x26
CDI45-2287-SPA

NOTE

Procedures are same for installing any pitch housing oil tank sight indicator.

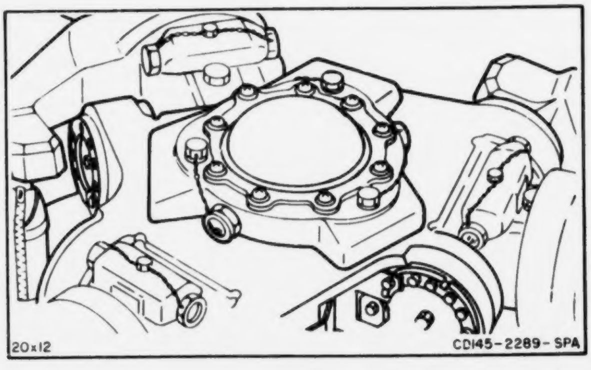
1. Lubricate packing (1). Use lubricating oil (E254). Install packing (1), on sight indicator (2).
2. **Install indicator (2)** in pitch housing oil tank (3). **Torque indicator to 115 inch-pounds. Do not lockwire at this time.**


3
1
2
20x12
CDI45-2288-SPA

INSPECT

FOLLOW-ON MAINTENANCE:

Service pitch housing oil tank (Task 1-56).


20x12
CDI45-2289-SPA

END OF TASK

5-13.1 REMOVE VERTICAL HINGE PIN OIL TANK SIGHT INDICATOR 5-13.1

INITIAL SETUP

Applicable Configurations:
All

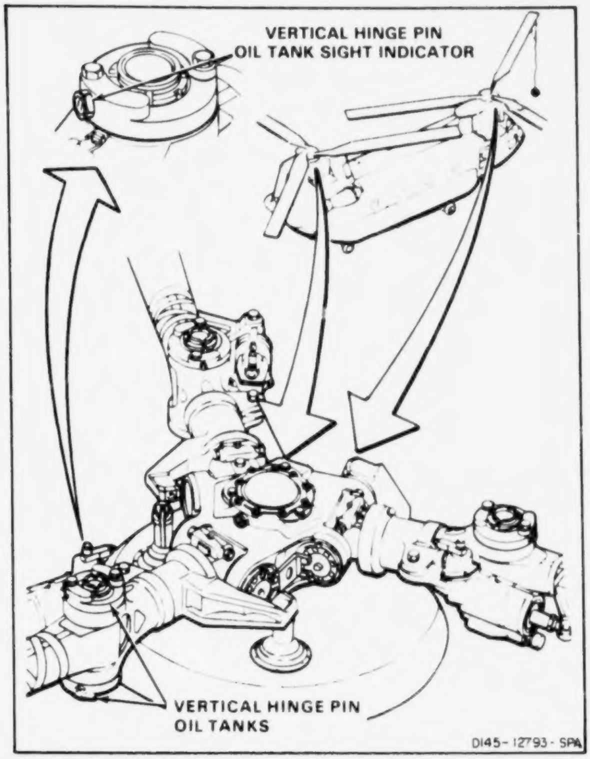
Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Container, Two-Quart
Torque Wrench, 30 to 150 Inch-Pounds

Materials:
Cloth (E120)
Lockwire (E231)
Gloves (E186)

Parts:
Packings

Personnel Required:
Aircraft Powertrain Repairer (2)

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Forward Rotor Blade Tied-Down (Task 1-26)
Work Platform Open (Task 2-2)


VERTICAL HINGE PIN OIL TANK SIGHT INDICATOR
VERTICAL HINGE PIN OIL TANKS
D145-12793-SPA

NOTE

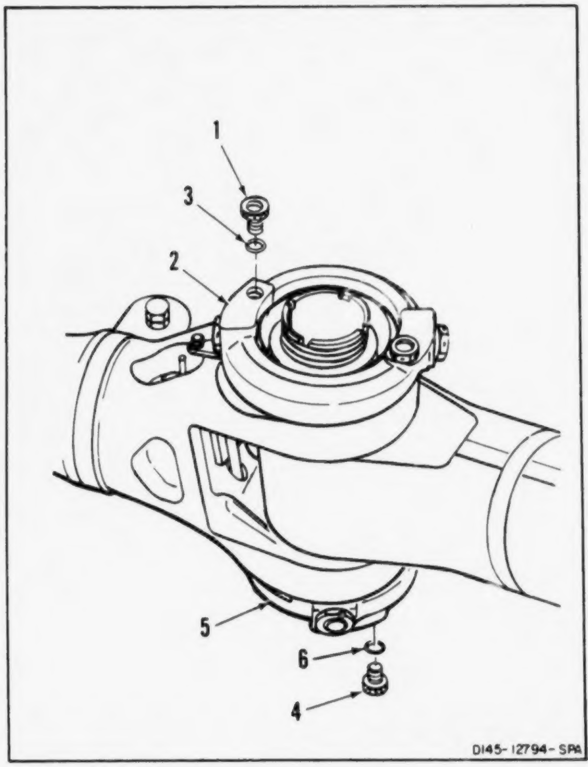
There are 12 vertical hinge pin oil tanks. Two sight indicators are on each oil tank. Procedure is similar to remove any sight indicator. Differences are noted in text.

1. Remove lockwire from one filler/drain plug (1) on upper tank (2). **Remove plug** and packing (3).

NOTE

One cup of oil must be drained when removing upper tank sight indicator. All oil must be drained when removing lower tank sight indicator.

2. Remove lockwire from one filler/drain plug (4) on lower tank (5). Remove plug and packing (6). **Drain oil.** Use container and cloth (E120) for spilled oil. Wear gloves (E186).



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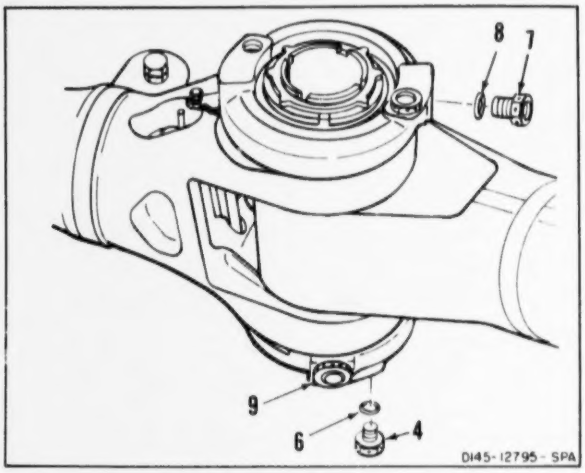
5-13.1 REMOVE VERTICAL HINGE PIN OIL TANK SIGHT INDICATOR (Continued) 5-13.1

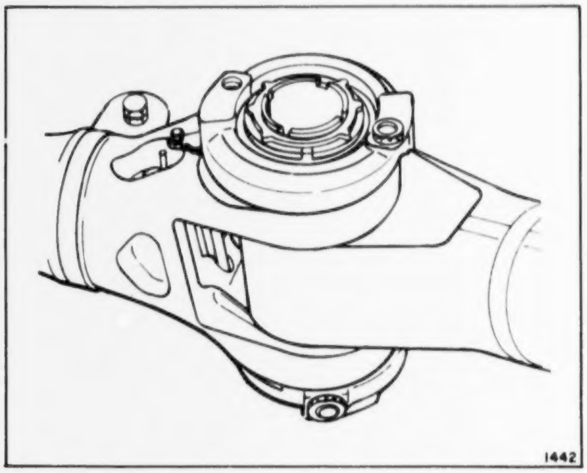
3. Remove lockwire from sight indicator (7). **Remove sight indicator and packing (8).**
4. **Install lower plug (4) and packing (6). Torque plug to 85 inch-pounds.**
5. Lockwire plug (4) to sight indicator (9). Use lockwire (E231).

INSPECT



FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-13.2 INSTALL VERTICAL HINGE PIN OIL TANK SIGHT INDICATOR 5-13.2

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267

Torque Wrench, 30 to 150 Inch-Pounds

Materials:

None

Parts:

Packings

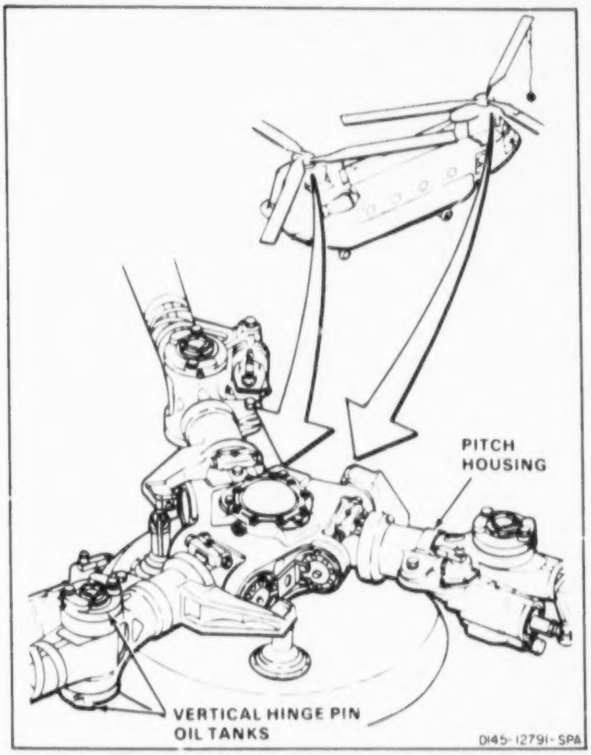
Personnel Required:

Aircraft Powertrain Repairer

Inspector

References:

TM 55-1520-240-23P

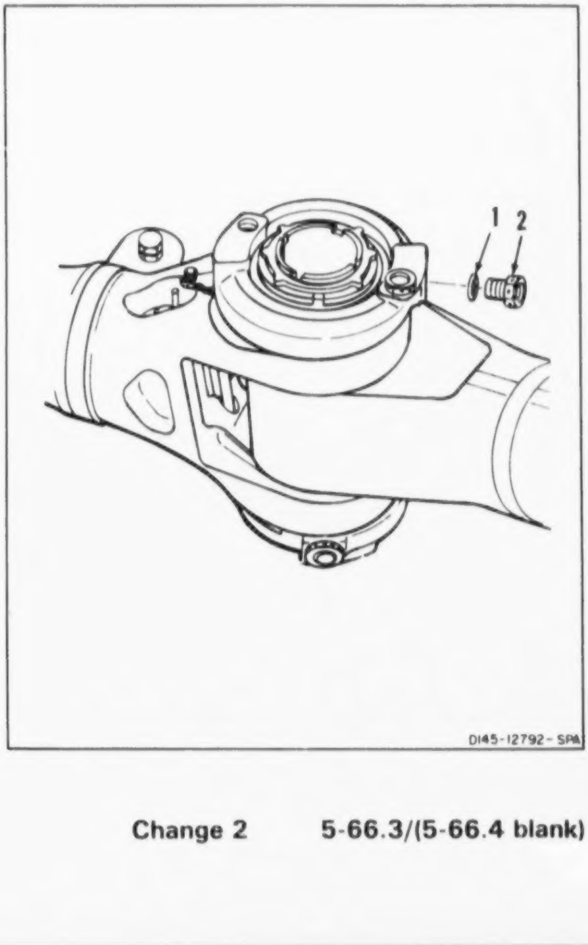


NOTE

There are 12 vertical hinge pin oil tanks. Two sight indicators are on each oil tank. Procedure is similar to install any sight indicator.

1. **Install packing (1) and sight indicator (2). Torque sight indicator to 125 inch-pounds.** Do not lockwire at this time.

INSPECT



FOLLOW-ON MAINTENANCE:

Service vertical hinge pin oil tank (Task 1-57).

END OF TASK

5-14 INSPECT HUB OIL TANK 5-14

INITIAL SETUP

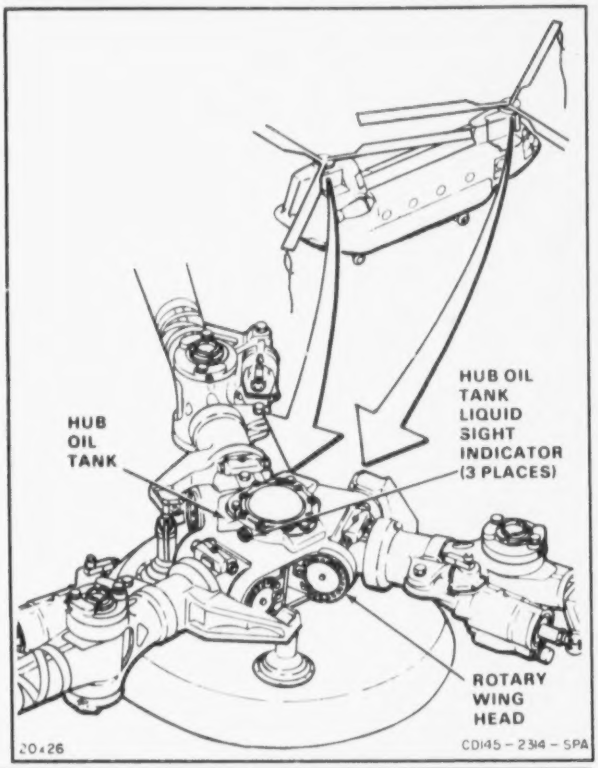
Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
Crocus Cloth (E122)

Personnel Required:
Inspector

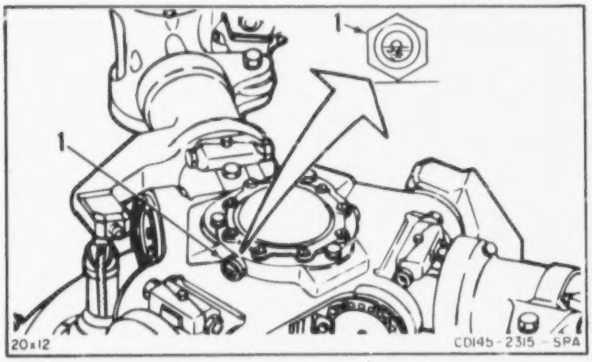
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Forward or Aft Work Platform Open (Task 2-2)
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)


HUB OIL TANK
HUB OIL TANK LIQUID SIGHT INDICATOR (3 PLACES)
ROTARY WING HEAD
20x26
CD145-2314-SPA

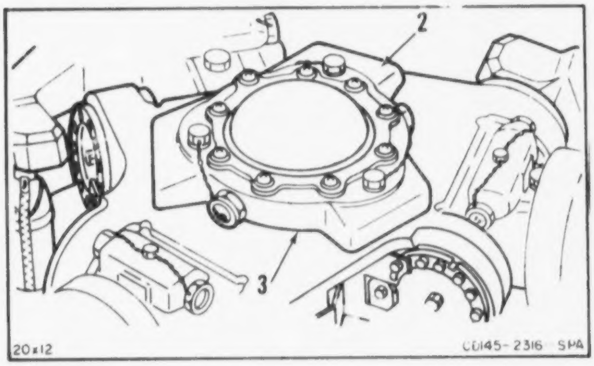
NOTE

Procedure is same to inspect forward or aft hub oil tanks.

1. **Check three liquid sight indicators (1).** There shall be no leaks or cracks.
   a. There shall be no leaks or cracks.
   b. If oil sight glass cannot be seen through, clean or replace sight glass.


1
1
20x12
CD145-2315-SPA

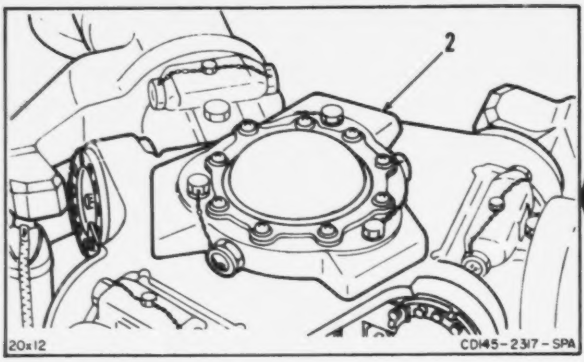
2. **Check seating of hub oil tank (2).** There shall be no oil leaks at joint of tank and hub (3).
3. **Check hub oil tank (2).** There shall be no cracks, dents or distortion.


2
3
20x12
CD145-2316-SPA

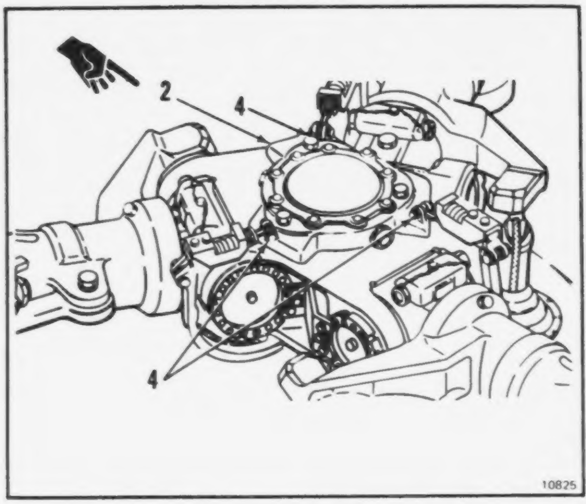
GO TO NEXT PAGE

5-14 INSPECT HUB OIL TANK (Continued) 5-14

4. **Check hub oil tank (2) for scores, nicks, or gouges.** Damage shall not exceed 0.020 inch in depth by 2.5 inches in length.



5. **On** oil tank of **aft hub** only, **check machined surfaces of lugs (4)** for scores, nicks, or gouges. Blend damage with crocus cloth (E122). Damage shall not exceed 0.005 inch deep by 1.0 inch long.



FOLLOW-ON MAINTENANCE:

Close work platform (Task 2-2).

END OF TASK

5-15 REMOVE HUB OIL TANK 5-15

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-323-5267

Two-Quart Container

Materials:

None

Personnel Required:

Powertrain Repairer (2)

References:

Task 5-10

Equipment Condition:

Battery Disconnected (Task 1-39)

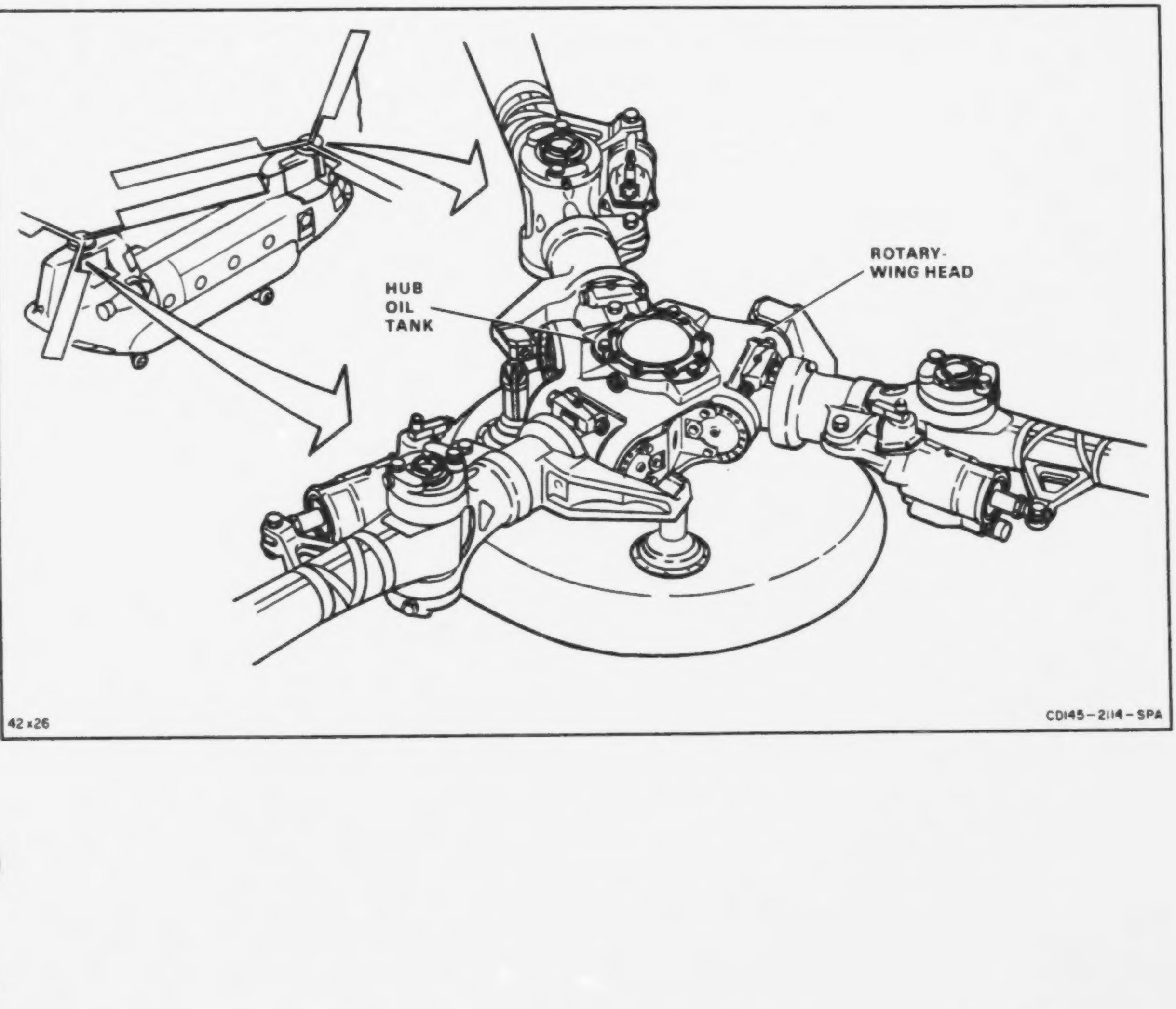
Electrical Power Off

Hydraulic Power Off

Forward or Aft Work Platform Open (Task 2-2)

Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)

Droop Stop Shrouds Removed (Aft Rotary-Wing Head Only) (Task 5-48.3)



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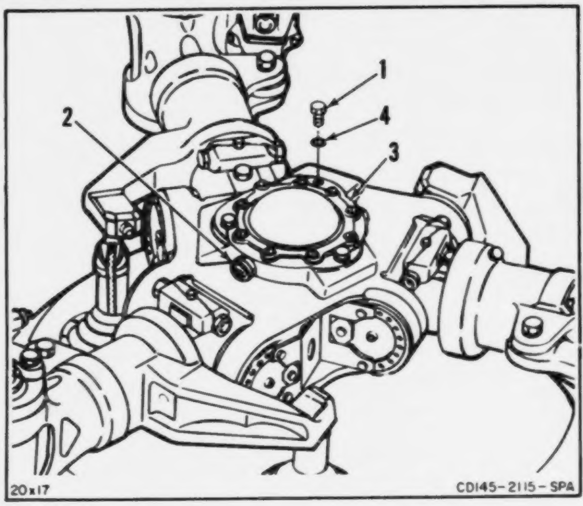
5-15 REMOVE HUB OIL TANK (Continued) 5-15

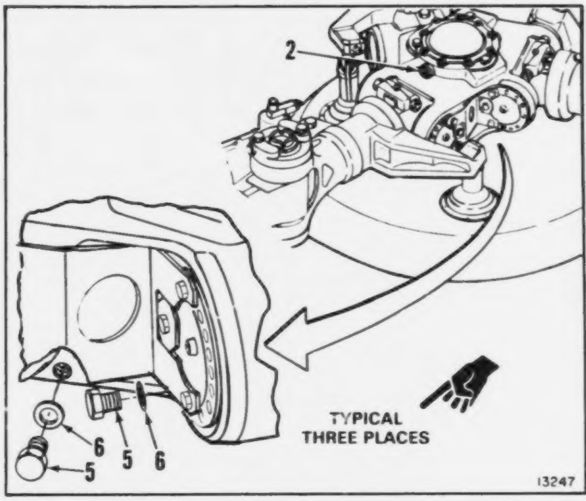
NOTE

Procedures to remove forward and aft magnesium and aluminum hub oil tanks are same except for differences noted in text.

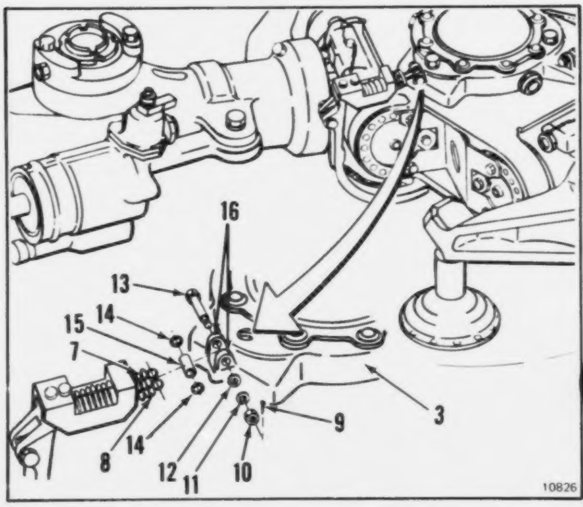
1. Remove lockwire from three filler plugs (1) and sight indicators (2) on oil tank (3). **Remove three filler plugs** and packings (4).



2. Remove lockwire from two lowest drain plugs (5). **Remove two drain plugs** and packings (6) at each of three places. Allow oil to drain until oil level is below lowest of sight indicators (2). Use container for oil.



3. **On aft hub oil tank (3) only, disconnect each of three droop stop springs (7) and limiter springs (8)** as follows:
   a. Remove cotter pin (9), nut (10), and washers (11 and 12).
   b. Support load of spring (7) and remove bolt (13).
   c. Remove spring (7), two washers (14), bearing (15), and inboard limiter spring (8) from lugs (16).
   d. Assemble bearing (15), two washers (14), spring (7), and limiter spring (8) with bolt (13), washers (11 and 12), and nut (10).

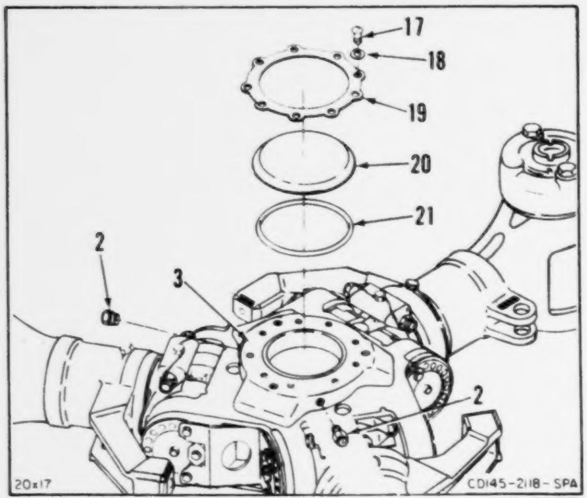


GO TO NEXT PAGE

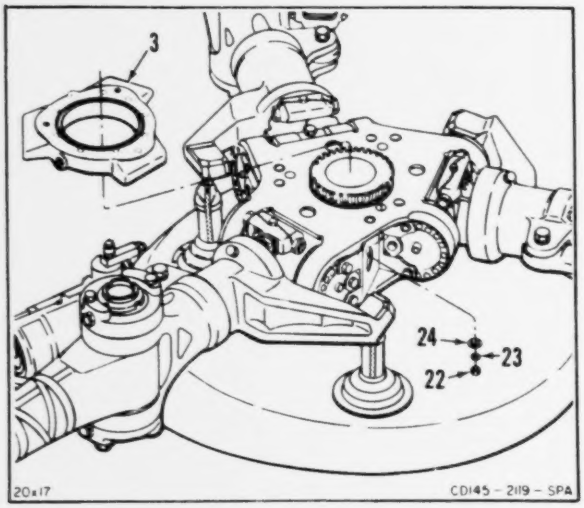
4. **If oil tank (3) is being replaced, remove three sight indicators (2) (Task 5-10).**
5. Remove six or nine screws (17) and washers (18). **Remove retainer (19), cover (20), and packing (21).**

NOTE

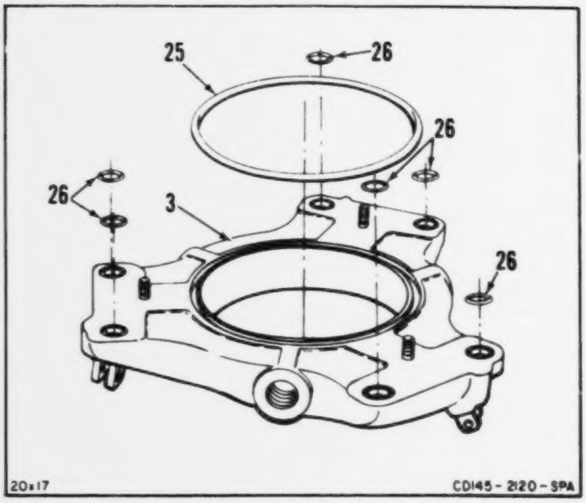
Three screws are removed when balancing arm shroud is removed from aft head.


17
18
19
20
21
2
3
2
20x17
CD145-2118-SPA

6. Remove three nuts (22), washers (23), and shouldered washers (24). **Remove oil tank (3).**


3
24
23
22
20x17
CD145-2119-SPA

7. Remove packing (25) and six packings (26) from oil tank (3).


25
26
26
26
3
26
20x17
CD145-2120-SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-16 REPAIR HUB OIL TANK (AVIM) 5-16

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit, NSN 5180-00-323-5114

Materials:
- Alodine Powder (E65)
- Crocus Cloth (E122)
- Wash Primer (E302)
- Epoxy Primer (E292)
- Black Lacquer (E215)
- Masking Tape (E388)
- Gauze Sponges (E184)
- Gloves (E186)
- Chromic Acid (E114)
- Naphtha (E245)

Personnel Required:
Aircraft Powertrain Repairer
Inspector

References:
TM 55-1500-335-23
MIL-M-3171
MIL-F-18264

Equipment Condition:
Off Helicopter Task

General Safety Instructions:

WARNING

Epoxy primer (E292) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes. Use gloves (E186).

CAUTION

Metallic dust and paint chips can block oil passages and damage rotary wing head. Tank openings must be plugged before reworking or refinishing tank.

NOTE

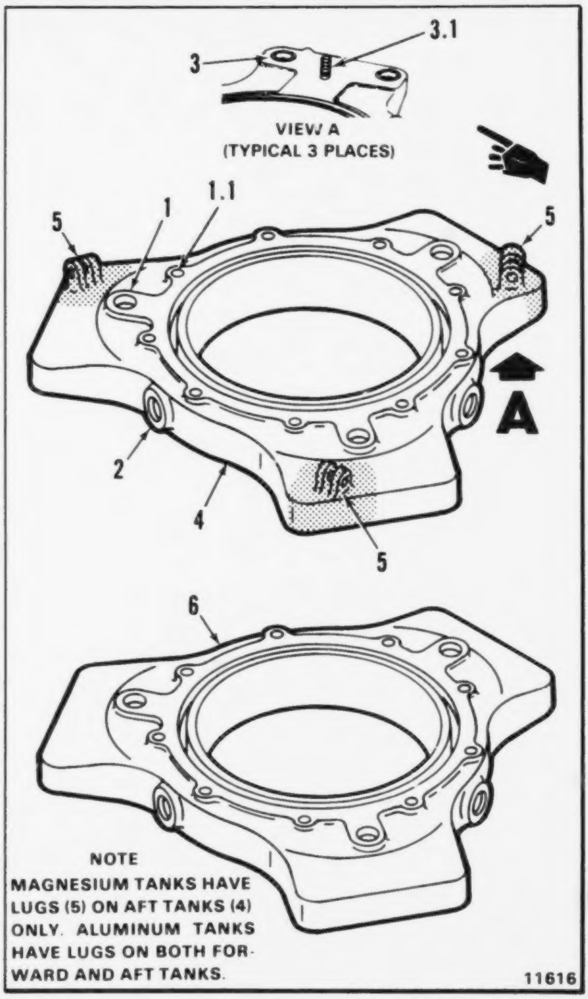
Procedure is same to repair forward and aft hub oil tanks except for differences noted in text.

1. Plug any filler plug hole (1), screw hole (1.1), sight indicator hole (2), or oil hole (3) near rework and refinish area. Cover studs (3.1). Use cap/plugs.
2. **On aft hub oil tank (4) only, check** machined surfaces of **lugs (5)** for scores, nicks, or gouges. **Blend damage with crocus cloth (E122).** Damage shall not exceed 0.005 inch deep by 1.0 inch long.
3. **Blend damage on all other areas of tanks (4) and (6) with crocus cloth (E122).** Damage limit is 0.020 inch deep by 2.5 inches long.
4. Fluorescent inspect damage over 0.010 inch deep before rework (TM 55-1500-335-23).

WARNING

Naphtha (E245) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

5. **Clean area with naphtha (E245)** and clean cloths (E120). Wear gloves (E186). Let area air dry.



NOTE
MAGNESIUM TANKS HAVE LUGS (5) ON AFT TANKS (4) ONLY. ALUMINUM TANKS HAVE LUGS ON BOTH FORWARD AND AFT TANKS.

GO TO NEXT PAGE

6. **Finish reworked areas of magnesium hub oil tank (4 or 6)** as follows:

WARNING

Chromic acid (E114) is extremely toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

Do not wash surface with hot water.

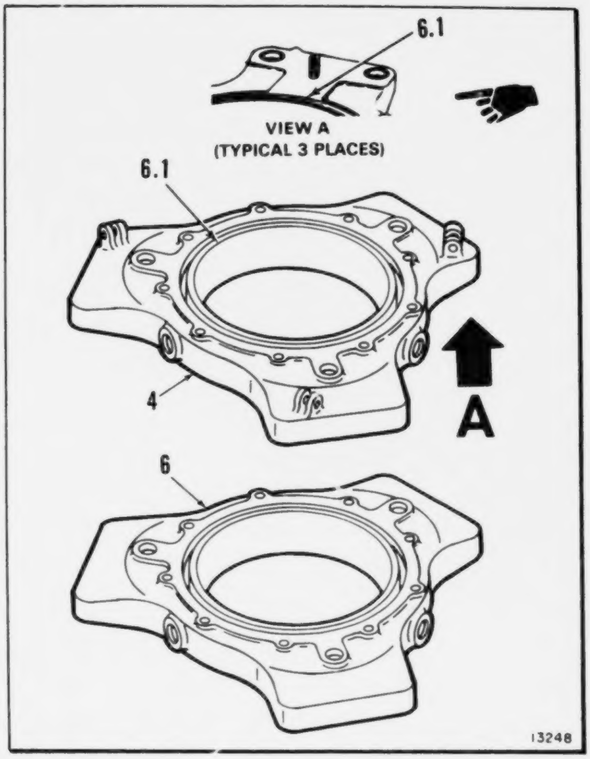
a. Prepare a type VI solution of chromic acid (E114) (MIL-M-3171).
b. Brush solution on blended areas of hub oil tanks (4 or 6). Wear gloves (E186).
c. Keep surface wet for 1 to 3 minutes, then wash surface with cold water and dry with hot air.

7. **Finish reworked areas of aluminum hub oil tank (4 or 6)** as follows:

WARNING

Alodine powder (E65) is an oxidizer. Discard cloths which contain this material in a separate container. If discarded with cloths contaminated with acetone, MEK or other organic solvents, combustion can result. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

a. Mix three ounces of alodine powder (E65) with one-half ounce of concentrated nitric acid (E22). Add mixture to one gallon of water.
b. **Swab alodine solution on area for 2 to 5 minutes.** Wear gloves (E187). Use gauze sponges (E184).
c. Rinse surface with cold water and let air dry.



8. Apply one coat of epoxy primer (E292). Wear gloves (E186). Let air dry for 1 hour.
9. Cover packing grooves (6.1) in refinish area. Use tape (E388). Apply two more coats of epoxy primer (E292). Wear gloves (E186). Allow 1 hour between coats.

WARNING

Lacquer (E215) is extremely flammable. It can be toxic. Keep away from heat, sparks, or open flames. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

10. Apply two coats of black lacquer (E215) per MIL-F-18264. Wear gloves (E186). Allow 30 minutes between coats.
11. Remove cap/plugs from hub oil tank (4 or 6). Remove covering from packing groove (6.1).

INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-17 INSTALL HUB OIL TANK 5-17

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-323-5267

Torque Wrench, 30 to 150 Inch-Pounds

Torque Wrench, 5 to 55 Inch-Pounds

Materials:

Lockwire (E231)

Cloths (E120)

Dry Cleaning Solvent (E162)

Gloves (E186)

Parts:

Packings

Personnel Required:

Powertrain Repairer (2)

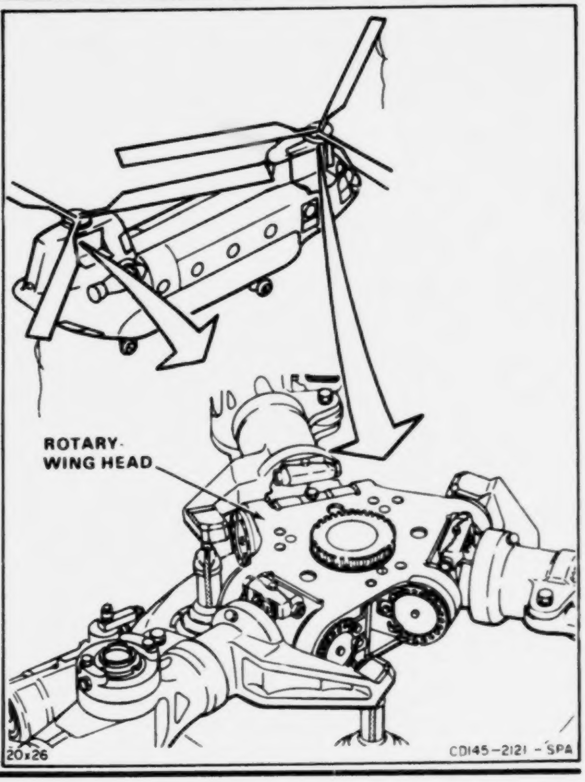
Inspector

References:

TM 55-1520-240-23P

Task 5-11

Task 5-57



WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

CAUTION

Dirty hub and oil tank surfaces can cause oil leaks.

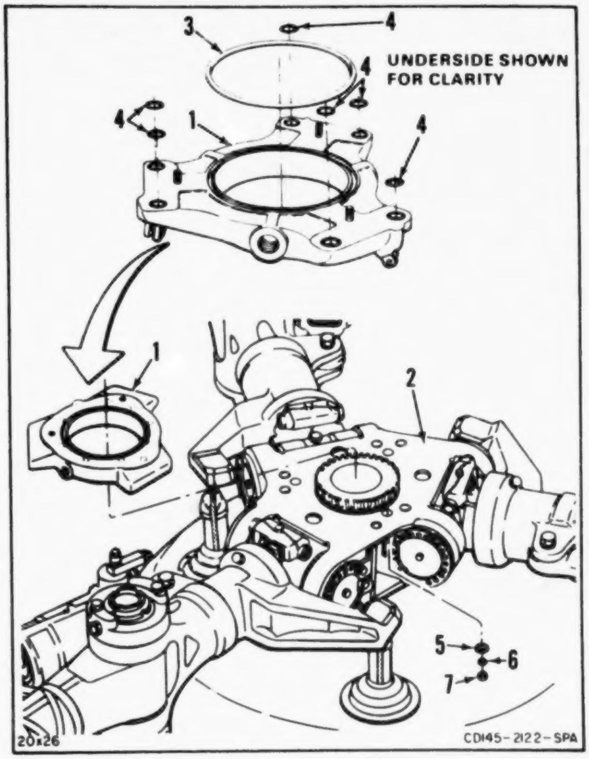
NOTE

Procedures to install forward and aft magnesium and aluminum hub oil tanks are same except for differences noted in text.

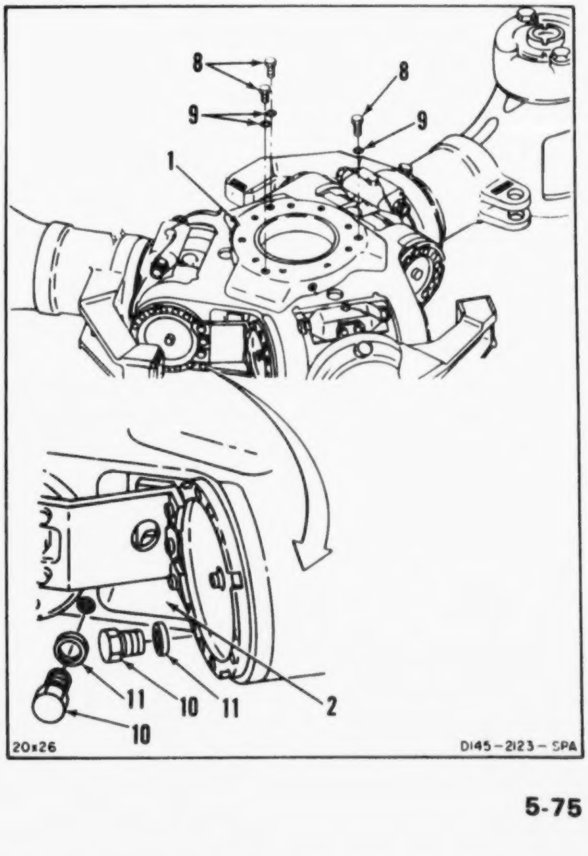
GO TO NEXT PAGE

5-17 INSTALL HUB OIL TANK (Continued) 5-17

1. Clean mating surfaces of oil tank (1) and hub (2). Use cloths (E120) damp with solvent (E162). Wear gloves (E186).
2. Install packing (3) and six packings (4) in grooves on bottom of oil tank (1).
3. **Install tank (1)** on hub (2). Install three shouldered washers (5), washers (6), and nuts (7). **Torque nuts to 60 inch-pounds.**


3
4
4
UNDERSIDE SHOWN FOR CLARITY
4
1
4
1
2
5
6
7
20x26
CD145-2122-SPA

4. **Install three filler plugs (8)** and packings (9) in tank (1). **Torque plugs to 85 inch-pounds.** Lockwire plugs with lockwire (E231).
5. **Install two drain plugs (10)** and packings (11) in hub (2). **Torque plugs to 25 inch-pounds.** Lockwire plugs with lockwire (E231).


8
8
9
9
1
11
10
11
2
10
20x26
D145-2123-SPA

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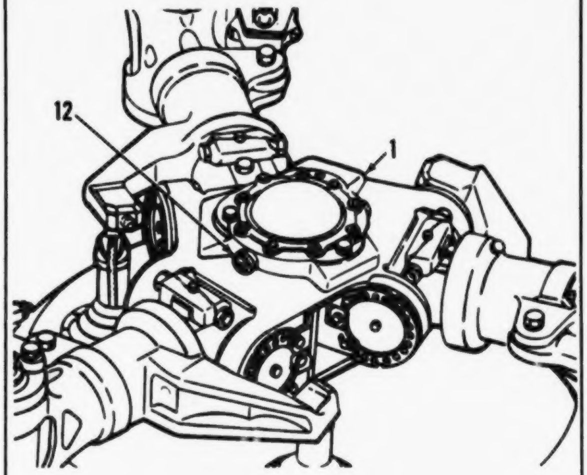
5-17 INSTALL HUB OIL TANK (Continued) 5-17

6. **If tank (1) is being replaced, install three sight indicators (12) (Task 5-11).**



20x26 CDI45-2124-SPA

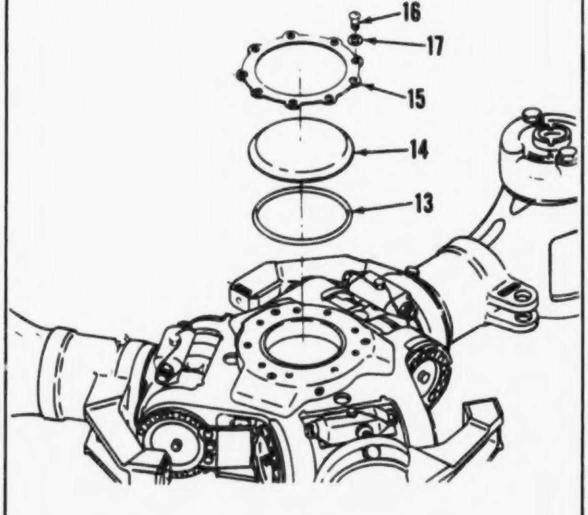
CAUTION

Mounting screws are different for magnesium or aluminum tanks. Use correct screws. Otherwise, component malfunction can occur.

NOTE

Only three screws are installed on aft head. Remaining six screws are installed when balancing arm shrouds are installed.

7. **Install packing (13), cover (14), and retainer (15).** Install three or nine screws (16) and washers (17). **Torque screws to 23 inch-pounds.**



20x26 CDI45-2125-SPA

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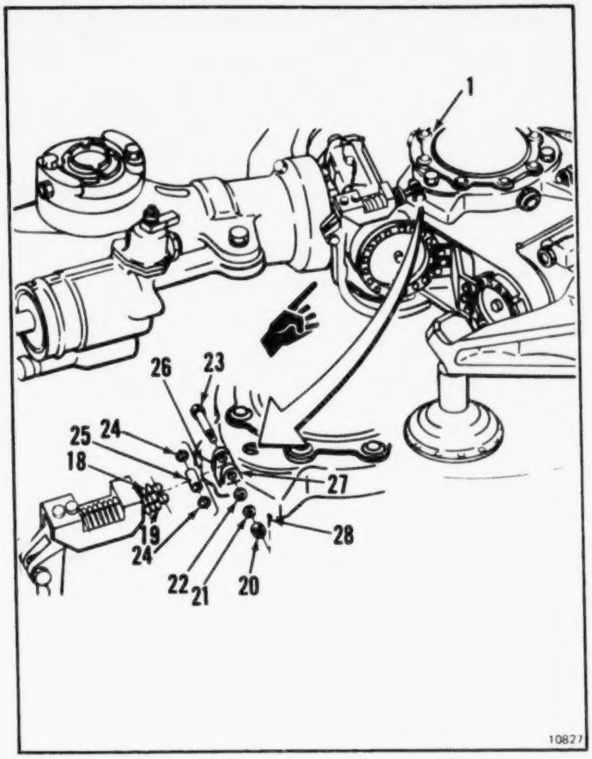
8. **On aft hub oil tank (1) only, connect each of three droop stop springs (18) and limiter springs (19)** as follows:
   a. Remove nut (20), washers (21 and 22), and bolt (23).
   b. Check that spring (18), limiter spring (19), two special washers (24), and bearing (25) are assembled as shown. (Task 5-57.)
   c. Install assembly (26) between lugs (27).
   d. Install bolt (23) and nut (20). Torque to 12-18 inch-pounds. Install cotter pin (28). Install washers (21 and 22) if required, to align cotter pin.



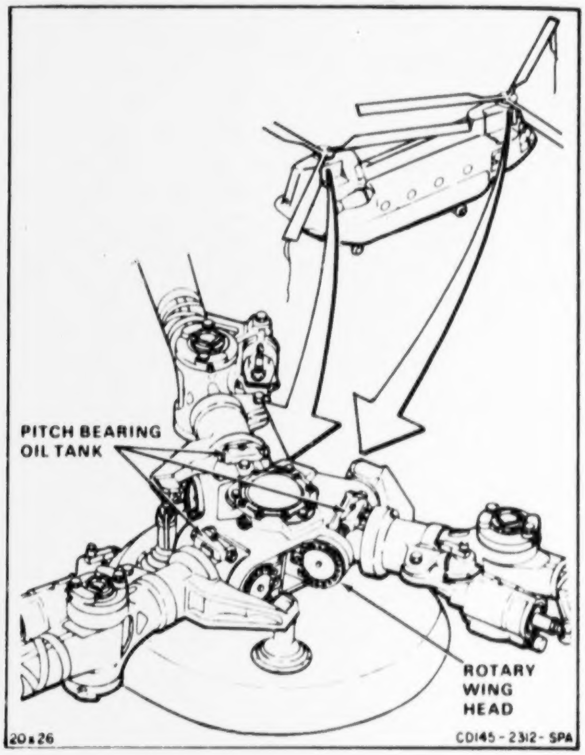
FOLLOW-ON MAINTENANCE:

Service hub oil tank (Task 1-55).

Install droop stop shrouds on aft rotor head (Task 5-48.5).

END OF TASK

5-18 INSPECT PITCH BEARING OIL TANKS 5-18



INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
67U30 Inspector

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)
Forward or Aft Work Platforms Open (Task 2-2)

NOTE

There are six pitch bearing oil tanks. Procedure is same to install all tanks.

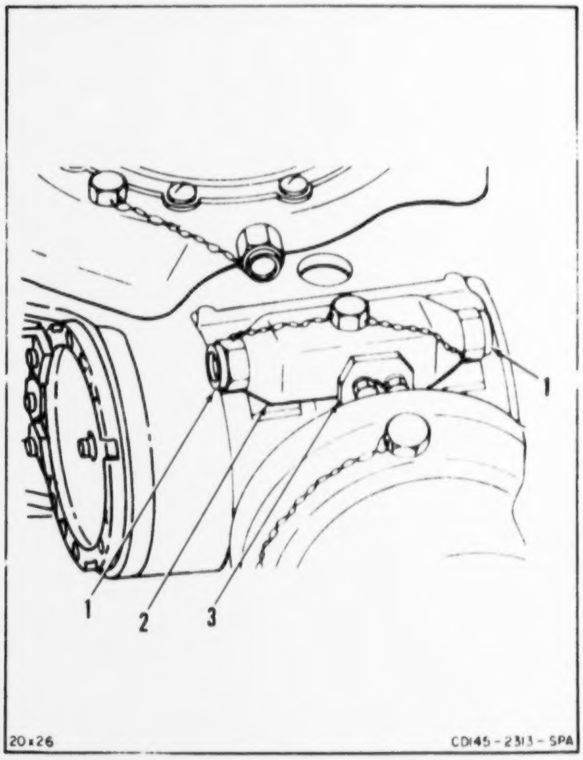
1. Check six sight indicators (1).

   a. There shall be no leaks or cracks.

   b. If oil sight glass cannot be seen through, clean or replace sight glass.

2. Check joint between three tanks (2) and pitch shafts (3). There shall be no oil leaks.

3. Check tanks (2) for scores, nicks, or gouges. Damage shall not exceed 0.020-inch in depth by 2.5 inches in length.



FOLLOW-ON MAINTENANCE:

Close work platform (Task 2-2).

END OF TASK

5-19 REMOVE PITCH BEARING OIL TANK 5-19

INITIAL SETUP

Applicable Configurations:
All

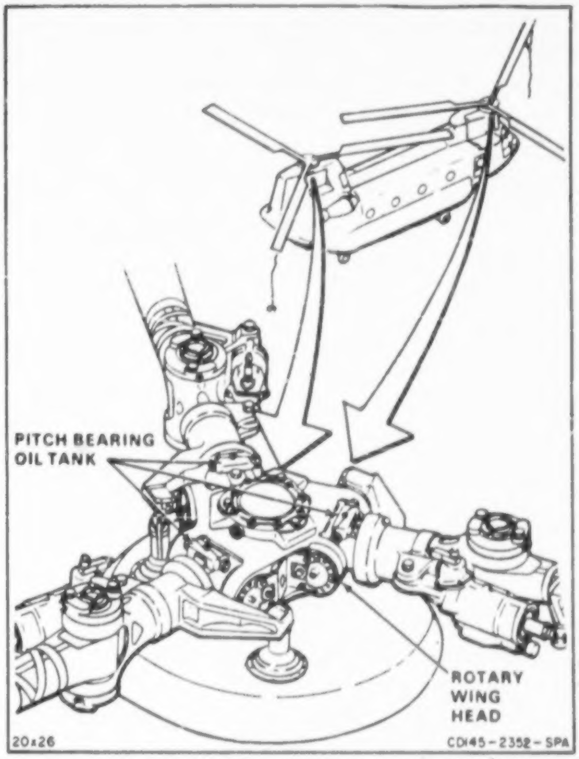
Tools:
Powertrain Repairer Tool Kit, NSN 5180-00-003-5267
2-Quart Container

Materials:
Cloth (E120)

Personnel Required:
Powertrain Repairer (2)

References:
Task 5-22

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Forward or Aft Work Platform Open (Task 2-2)
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)



NOTE

There are six pitch bearing oil tanks. Procedure is same to remove all tanks.

1. If magnesium oil tank assembly 114R2179-5 is being replaced with aluminum assembly 145R2179-1, remove pitch varying housing (1) (Task 5-22).

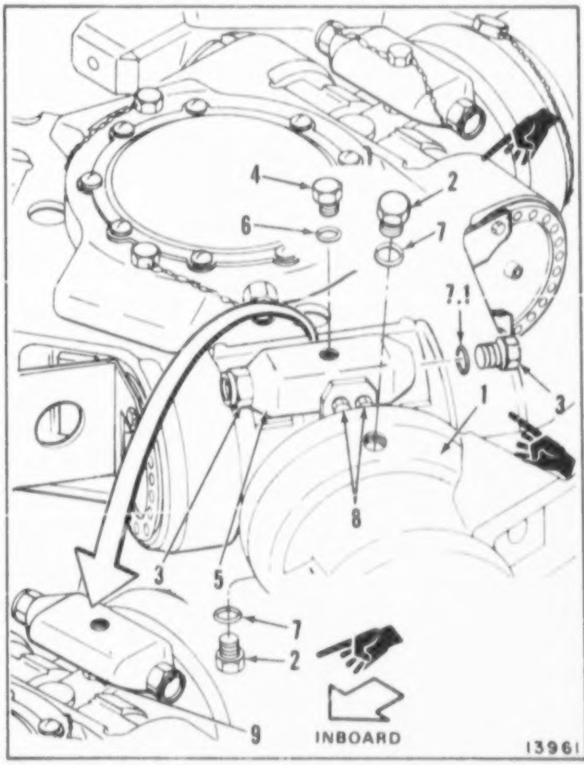
1.1. If housing (1) was not removed, remove lockwire from two plugs (2). Remove lockwire from two sight indicators (3) and filler plug (4) on pitch bearing oil tank (5).

2. **Remove filler plug (4)** and packing (6) from tank (5).

3. Remove two plugs (2) and packings (7) from housing (1). Drain oil from tank (5). Use container for oil. Use cloth (E104) for spilled oil.

3.1. If tank (5) will be replaced, remove two sight indicators (3) and packings (7.1).

4. Remove lockwire from two bolts (8) and lug (9) on tank (5).



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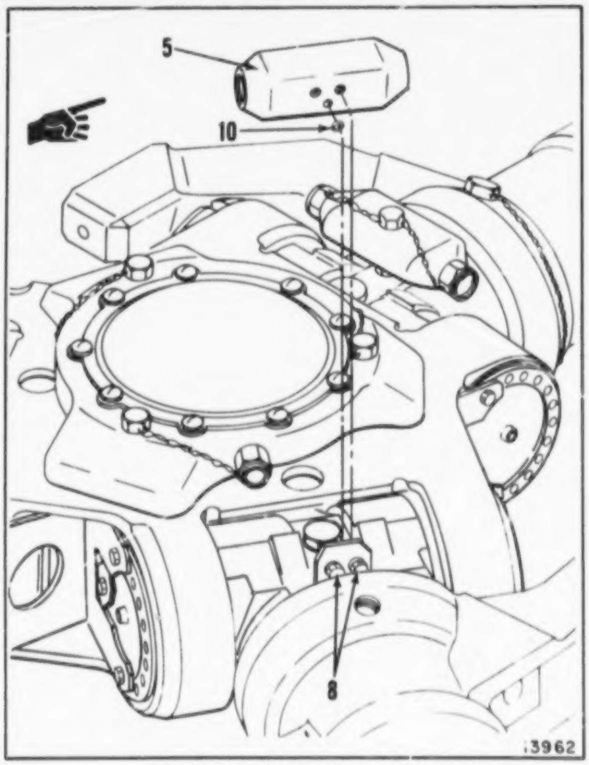
5-19 REMOVE PITCH BEARING OIL TANK (Continued) 5-19

NOTE

Tank can be removed when bolts are loosened. Bolts need not be removed.

5. Loosen two bolts (8) until they are free of tank (5). **Remove tank** and packing (10).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-20 REPAIR PITCH BEARING OIL TANK (AVIM) 5-20

INITIAL SETUP

Applicable Configurations:

All

Tools:

Technical Inspection Tool Kit, NSN 5180-00-323-5114

Plastic or Aluminum Scraper

Materials:

Alodine Powder (E65)

Crocus Cloth (E122)

Wash Primer (E302)

Epoxy Primer (E292)

Black Lacquer (E215)

Cloths (E120)

Dry Cleaning Solvent (E162)

Masking Tape (E388)

Gauze Sponges (E184)

Gloves (E186)

Chromic Acid (E114)

Nitric Acid (E22)

Personnel Required:

Aircraft Powertrain Repairer

Inspector

References:

TM 55-1500-335-23

MIL-C-5541

MIL-M-3171

MIL-F-18264

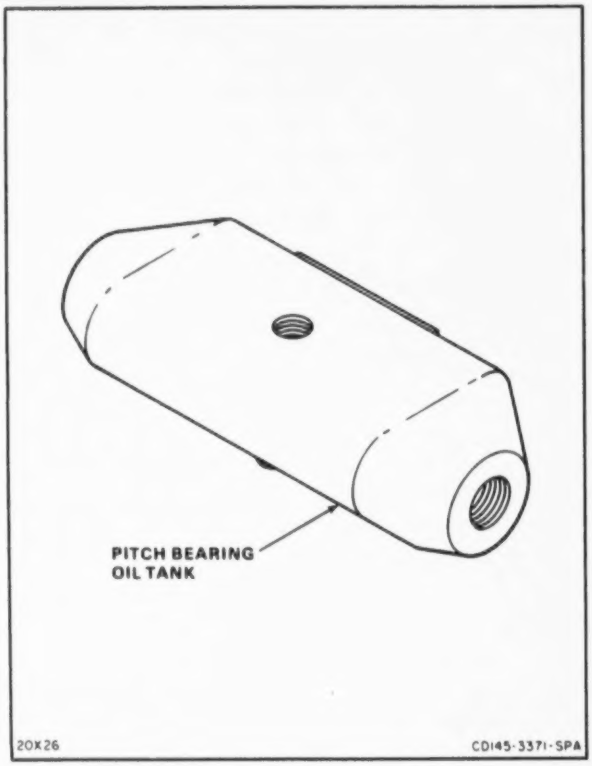
Equipment Condition:

Off Helicopter Task

General Safety Instructions:

WARNING

Epoxy primer (E292) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes. Use gloves (E186).



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WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

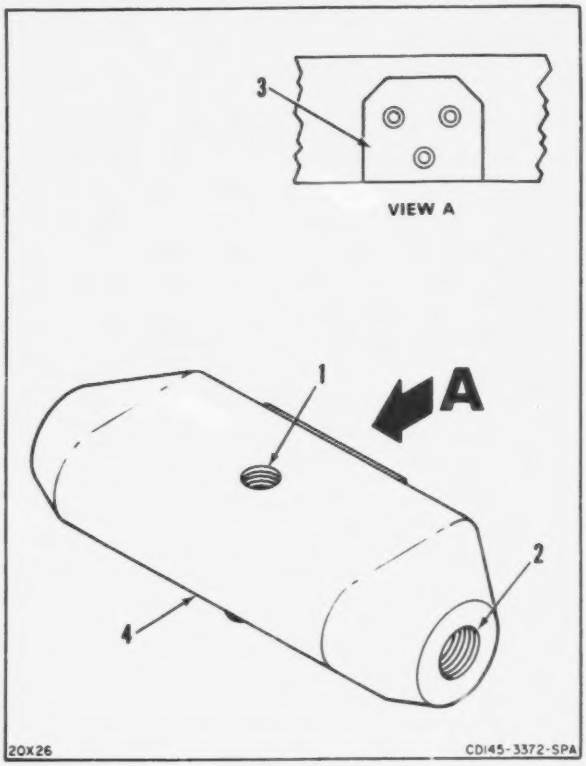
CAUTION

Metallic dust and paint chips can block oil passages and damage rotary wing head. Tank openings must be plugged before reworking or refinishing tank.

NOTE

Procedure is same to repair all six pitch bearing oil tanks.

1. Plug filler plug hole (1) and both sight indicator holes (2). Use caps or plugs. Mask mounting surface (3) near rework and refinish area. Use masking tape (E388).
2. Clean mounting surface of tank (4). Use plastic or aluminum scraper and cloths (E120) damp with solvent (E162). Use gloves (E186).
3. **Blend scores, nicks, or gouges** on tank (4). Damage limit is 0.020 inch in depth by 2.5 inches in length. Blend to width at least 10 times depth of damage. Use crocus cloth (E122).



5-20 REPAIR PITCH BEARING OIL TANK (AVIM) (Continued) 5-20

4. Fluorescent inspect damage that exceeded 0.010 inch in depth before rework (TM 55-1500-335-23).
5. **Finish reworked areas of magnesium pitch bearing oil tank (4)** as follows:

WARNING

Chromic acid (E114) is extremely toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

NOTE

Do not wash surface with hot water.

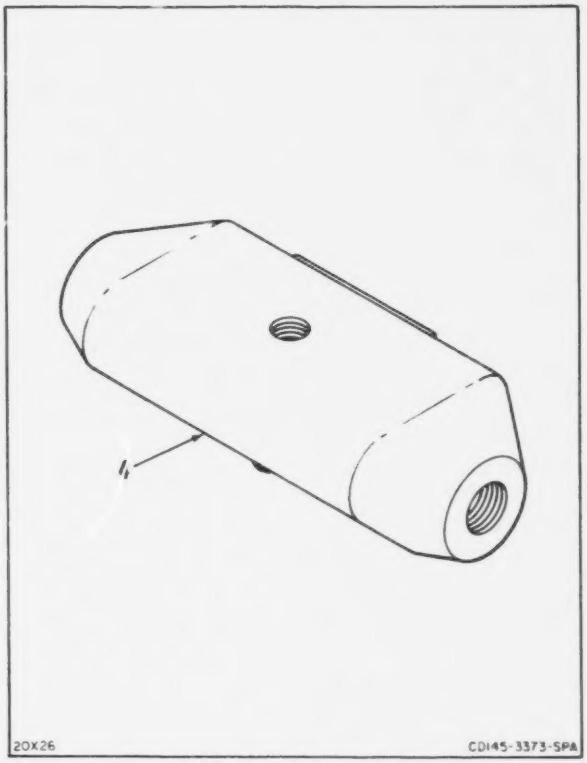
   a. Prepare a type VI solution of chromic acid (E114) (MIL-M-3171).
   b. Brush solution (E114) on blended areas (MIL-L-3171). Wear gloves (E186).
   c. Keep surface wet for 1 to 3 minutes, then wash surface with cold water and dry with hot air.

6. **Finish reworked areas of aluminum pitch bearing oil tank (4)** as follows:

WARNING

Alodine powder (E65) is an oxidizer. Discard cloths which contain this material in a separate container. If discarded with cloths contaminated with acetone, MEK or other organic solvents, combustion can result. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

   a. Mix three ounces of alodine powder (E65) with one-half ounce of concentrated nitric acid (E22). Add mixture to one gallon of water.
   b. **Swab alodine solution on area (MIL-C-5541). Swab for 2 to 5 minutes.** Wear gloves (E186). Use gauze sponges (E184).



   c. Rinse surface with cold water and let air dry.

7. Apply one coat of epoxy primer (E292). Wear gloves (E186). Let air dry for one hour.
8. Apply two more coats of epoxy primer (E292). Wear gloves (E186). Allow 1 hour between coats.
9. Apply two coats of black lacquer (E215) per MIL-F-81264. Wear gloves (E186). Allow 30 minutes between coats.
10. Remove cap/plugs and masking tape (E388) from pitch bearing oil tank (4).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-21 INSTALL PITCH BEARING OIL TANK 5-21

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powertrain Repairer Tool Kit,
NSN 5180-00-003-5267
Torque Wrench, 0 to 30 Inch-Pounds
Torque Wrench, 30 to 150 Inch-Pounds
Plastic or Aluminum Scraper

Materials:
Adhesive (E63.1)
Cloth (E120)
Dry Cleaning Solvent (E162)
Lockwire (E231)
Gloves (E186)

Parts:
Packings

Personnel Required:
Aircraft Powertrain Repairer (2)
Inspector

References:
Task 1-56
Task 5-22
Task 5-23
TM 55-1520-240-23P

General Safety Instructions:

WARNING

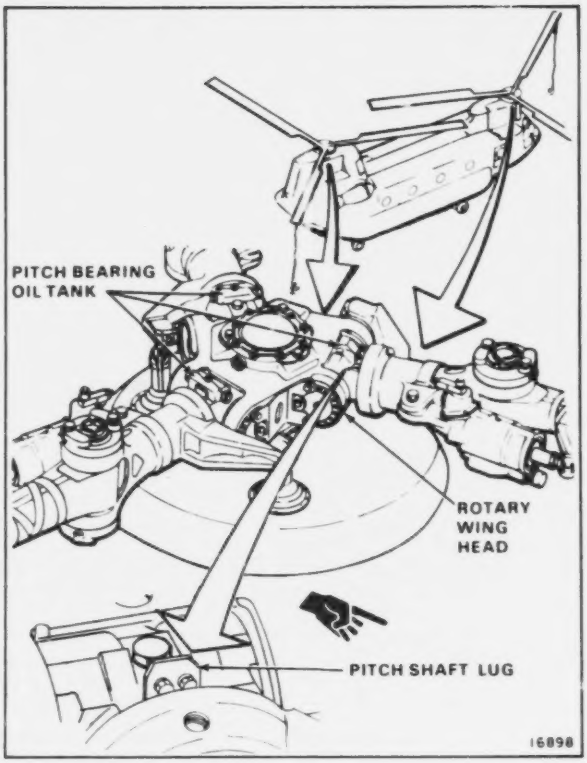
Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Adhesive (E63.1) can form toxic vapors if material burns or if cured product is heated above 288°C (550°F). In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

There are six pitch bearing oil tanks. Procedure is the same to install all tanks. Both magnesium and aluminum tanks are used. Do not mix tanks on same rotary-wing head.



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5-21 INSTALL PITCH BEARING OIL TANK (Continued) 5-21

1. Clean mounting surfaces of tank (1) and shaft lug (2). Use plastic or aluminum scraper and cloths (E120) damp with solvent (E162). Wear gloves (E186).
2. If replacing a magnesium tank (1) with an aluminum tank, remove pitch-varying housing (3) (Task 5-22).
3. Apply bead of adhesive (E63.1) (3) to edge of tank area which will attach to shaft lug (2). Wear gloves (E186).
4. Install packing (4) in groove on face of tank (1).

CAUTION

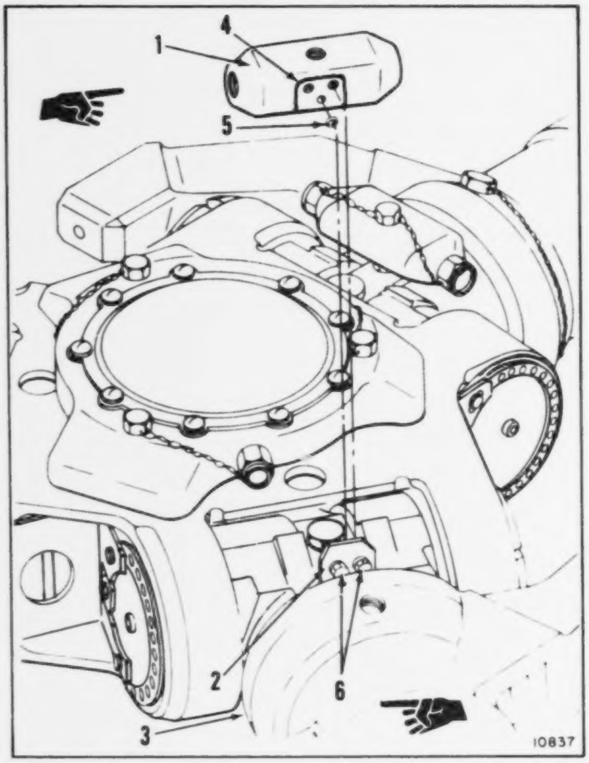
Mounting bolts for aluminum tanks are shorter than those for magnesium tanks. Use correct bolts. Otherwise, tank can be damaged.

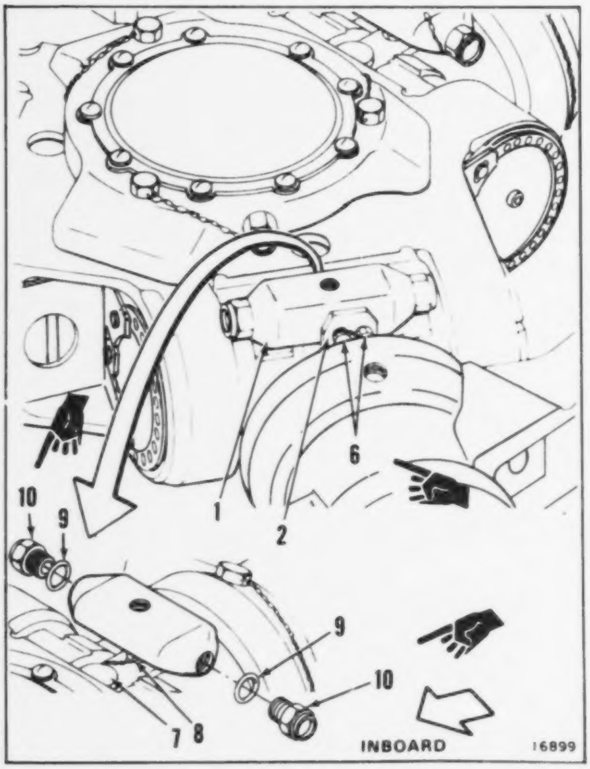
5. **Position tank (1)** against shaft lug (2). **Screw two bolts (6) into tank.**

CAUTION

Do not overtorque tank mounting bolts. Overtorque can damage tank or bolts.

6. **Torque bolts (6) to 15 inch-pounds.** Use 3/8-inch crowfoot and socket extension.
7. Wipe excess adhesive (E63.1) from shaft lug (2). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
8. Lockwire bolts (6) together. Lockwire bolt (7) to lug (8). Use lockwire (E231).
9. If tank (1) is new, install packings (9) and two sight indicators (10). **Torque to 115 inch-pounds.**





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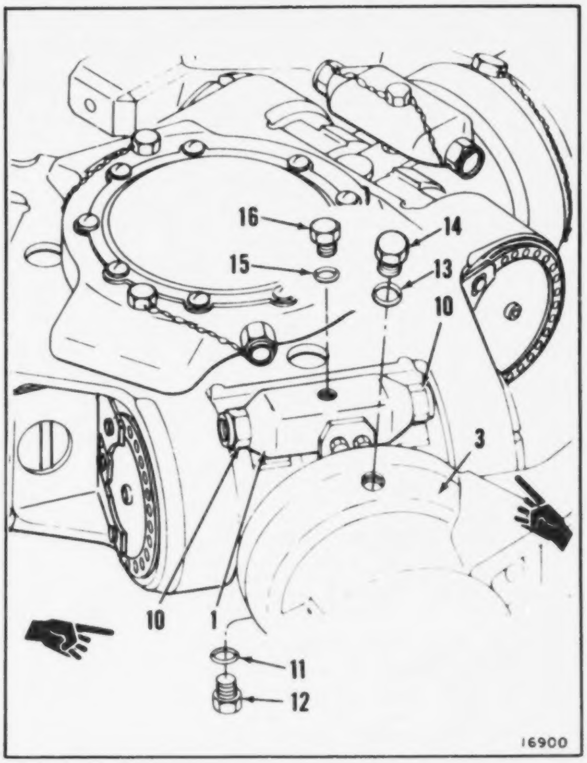
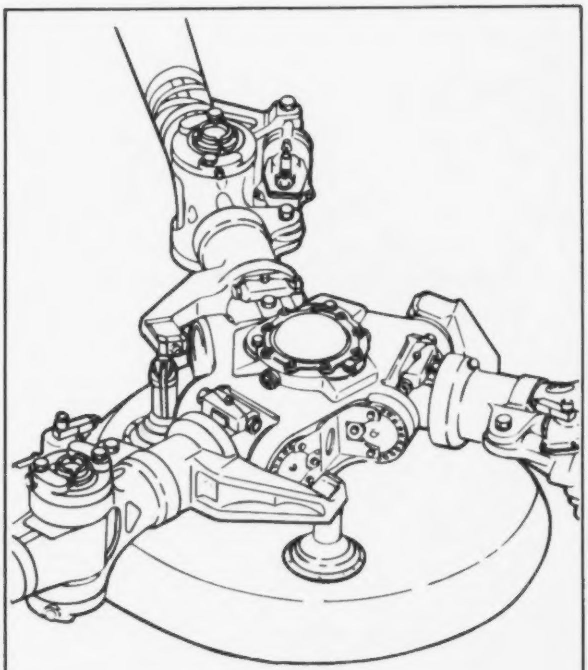
5-21 INSTALL PITCH BEARING OIL TANK (Continued) 5-21

10. **Install** packing (11) and **lower plug (12)** on housing (3). **Torque plug to 24 inch-pounds.**
11. If required, install pitch-varying housing (3) (Task 5-23).
12. **Service pitch bearing oil tank (1)** until oil reaches top of housing (3) (Task 1-56).
13. **Install** packing (13) and **upper plug (14). Torque to 24 inch-pounds.** Lockwire plug to lower plug (12). Use lockwire (E231).
14. Continue servicing pitch bearing oil tank (1) until oil reaches center of sight indicators (10) (Task 1-56).
15. **Install** packing (15) and **filler plug (16). Torque to 24 inch-pounds.** Lockwire filler plug to two sight indicators (10).
16. If removed, install pitch housing (3) (Task 5-23).



FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-21.1 INSPECT PITCH-VARYING SHAFTS 5-21.1

INITIAL SETUP

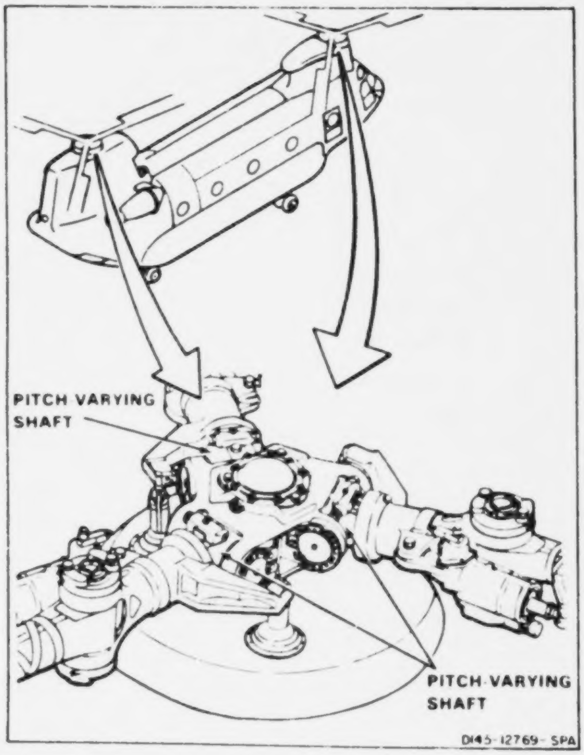
Applicable Configurations:
All

Tools:
None

Materials:
None

Personnel Required:
Inspector

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Forward or Aft Work Platforms Open (Task 2-2)


PITCH VARYING SHAFT
PITCH-VARYING SHAFT
D145-12769-SPA

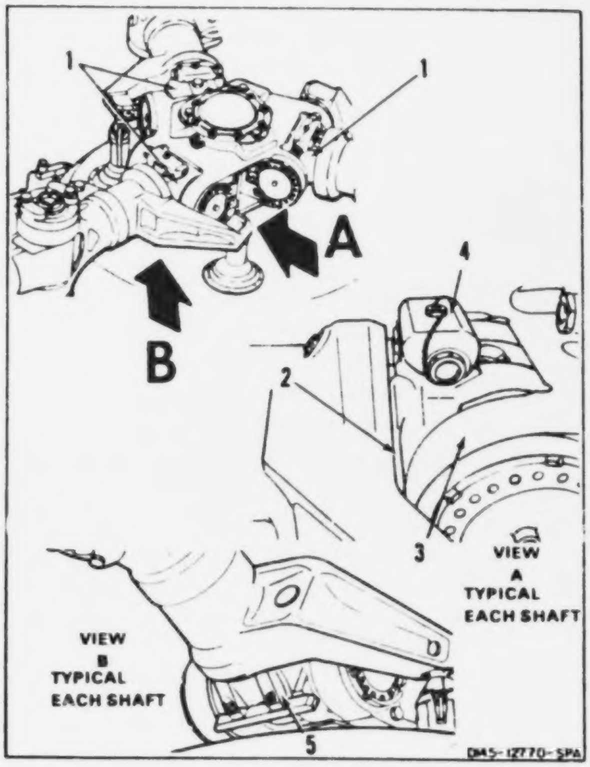
NOTE

- Paint removal is not required for shaft inspection.
- Inspect shafts on forward and aft heads in same manner.
- Rotary-wing blades shall be installed during inspection and resting on droop stops.

1. **Check entire visible portion of pitch-varying shaft (1)** for cracks. **Pay special attention to leading edge side of shaft** between flange (2) and horizontal hinge pin barrel (3) from oil tank (4) to droop stop mounting boss (5). **There shall be no cracks.**
2. If a crack is suspected, perform fluorescent-penetrant inspection (Task 5-21.2).

FOLLOW-ON MAINTENANCE:

Close work platforms (Task 2-2).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1
A
B
4
2
3
VIEW A TYPICAL EACH SHAFT
VIEW B TYPICAL EACH SHAFT
5
D145-12770-SPA

END OF TASK

5-21.2 INSPECT PITCH-VARYING SHAFTS (AVIM) 5-21.2

INITIAL SETUP

Applicable Configurations:
All

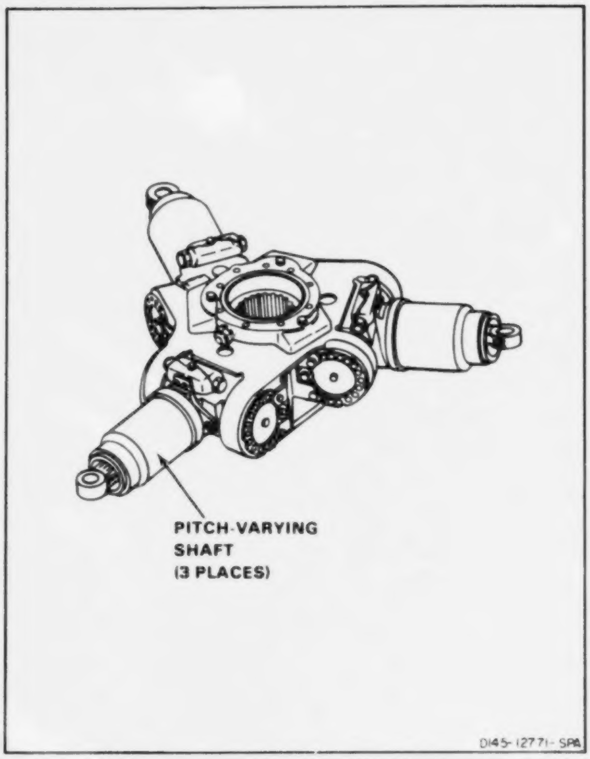
Tools:
None

Materials:
Cloths (E120)
Acetone (E20)
Lacquer (E213)
Gloves (E186)

Personnel Required:
Aircraft Powertrain Repairer
Inspector

References:
TM 55-1500-335-23

Equipment Condition:
Off Helicopter Task
Pitch-Varying Housing Removed (Task 5-22)



NOTE

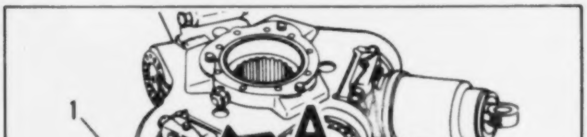
Procedure is same to inspect any pitch-varying shaft on forward or aft head.

REMOVE FINISH

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Remove finish from shaft (1) from area between flange (2) and horizontal hinge pin barrel (3) around both sides of shaft from oil tank (4) to droop stop mounting bosses (5). Use acetone (E20) and clean cloths (E120).



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5-21.2 INSPECT PITCH-VARYING SHAFTS (AVIM) (Continued) 5-21.2

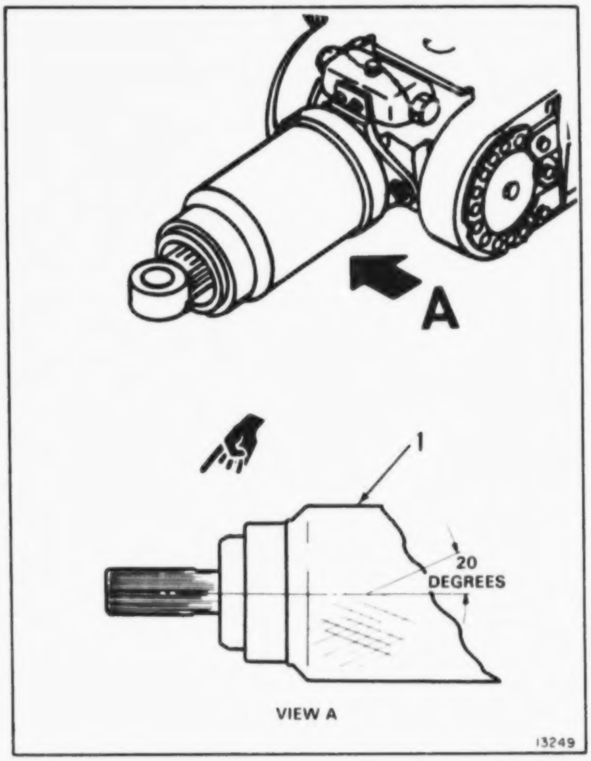
INSPECT SHAFT

2. **Fluorescent inspect** cleaned area to check for cracks. (Refer to TM 55-1500-335-23.) **There shall be no cracks.**

WARNING

Lacquer (E213) is extremely flammable. It can be toxic. Keep away from heat, sparks, or open flames. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. If no cracks are found, remove inspection coating. (Refer to TM 55-1500-335-23.) **Apply clear lacquer (E213) to cleaned area.**
4. Check shaft (1) for scores, nicks, or gouges. Damage shall not be over 0.005 inch deep or 2.5 inches long. Direction of scores shall not be more than a 20 degree angle from shaft centerline.



FOLLOW-ON MAINTENANCE:

Install pitch-varying housing (Task 5-23).

END OF TASK

5-21.3 INSPECT ROTOR HUB SURFACE 5-21.3

INITIAL SETUP

Applicable Configurations:
All

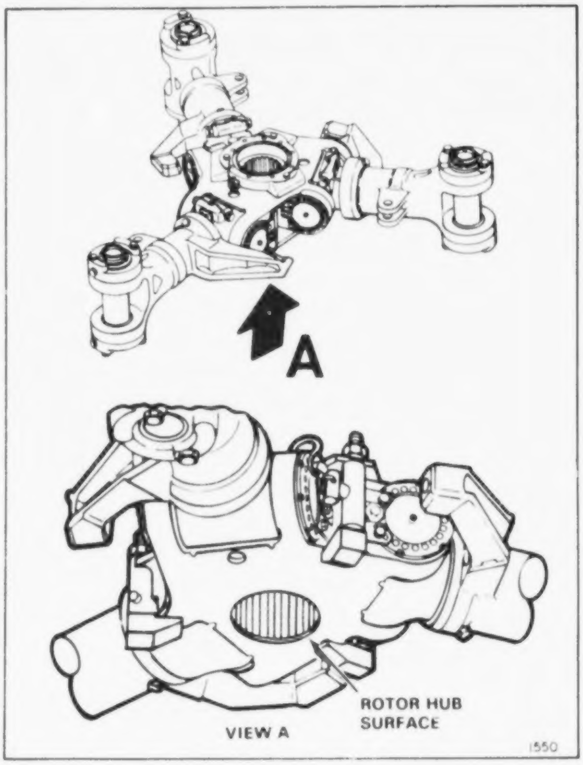
Tools:
None

Materials:
Cloths (E120)
Acetone (E20)
Abrasive Pad (E2)
Gloves (E186)

Personnel Required:
Aircraft Powertrain Repairer
Inspector

Equipment Condition:
Off Helicopter Task

General Safety Instructions:



WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

WARNING

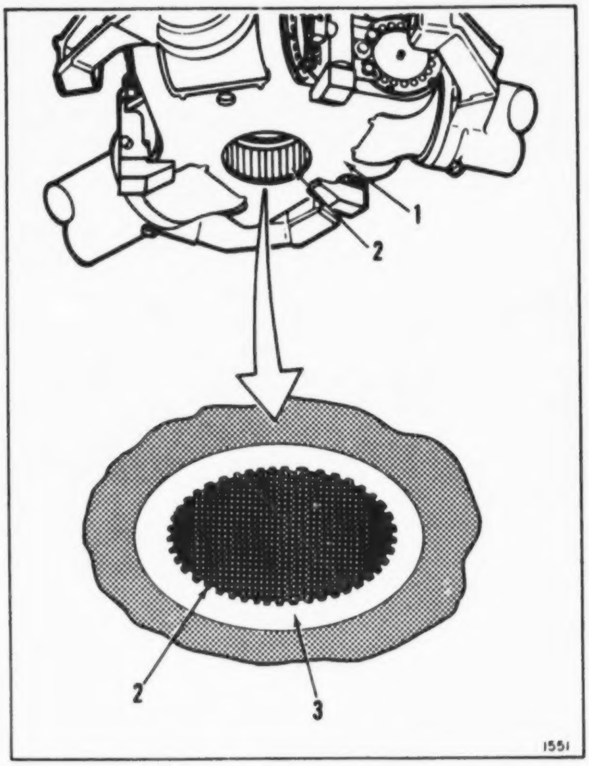
Primers (E294 and E302) are flammable and toxic. They can irritate skin and cause burns. Use only with adequate ventilation, away from heat or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

CAUTION

Power tools shall not be used to remove finish. Damage to head can result.

GO TO NEXT PAGE

5-21.3 INSPECT ROTOR HUB SURFACE (Continued) 5-21.3



NOTE

Procedure is same for forward and aft heads.

1. Position head (1) so that splines (2) on underside are accessible.
2. **Remove lacquer finish from a 1-inch wide strip (3) around splines (2).** Use acetone (E20) and clean cloths (E120).
3. **Remove primer coat** to bare metal from strip (3). Use abrasive pads (E2) and acetone (E20). Wear gloves (E186).
4. **Rinse finish removal area** with a clean cloth (E120) soaked in water. **Dry area** with a clean dry cloth.
5. **Perform fluorescent-penetrant inspection of strip (3) around splines (2).** (Refer to TM 43-0103.) **There shall be no cracks.**
6. If no cracks are found, remove inspection coating. (Refer to TM 43-0103.)
7. Refinish strip (3) as follows:
   a. **Apply one coat of wash primer (E302).** Wear gloves (E186). Let air dry for 1 hour . Do not let dry more than 4 hours .
   b. **Apply one coat of fast drying primer (E294).** Wear gloves (E186). Let air dry for 1 hour . Do not let dry more than 2 hours .

WARNING

Lacquer (E213) is extremely flammable. It can be toxic. Keep away from heat, sparks, or open flames. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

   c. **Apply two coats of black lacquer (E215).** Wear gloves (E186). Let air dry 1 hour between coats.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-22 REMOVE PITCH VARYING HOUSING 5-22

INITIAL SETUP

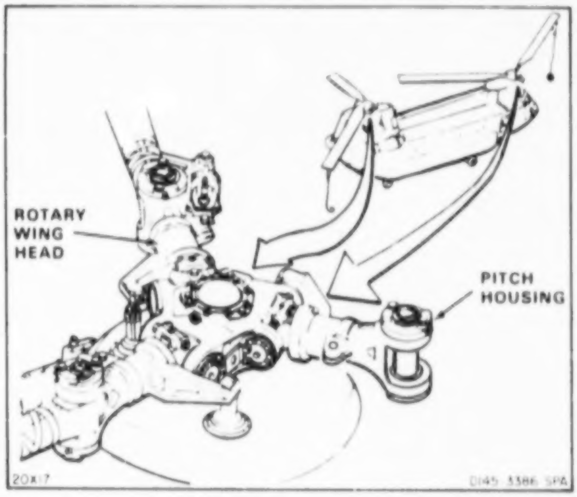
Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Two-Quart Container
Phenolic Drift, 3/4-Inch X 12-Inches
Crow's Foot, 7/16-Inch

Materials:
Cloth (E120)
Grease (E190)
Paper Tag (E264)
Barrier Material (E80)
Tape (E404 through E409, As Required)

Personnel Required:
Aircraft Powertrain Repairer (2)

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied Down (Task 1-26)
Work Platform Open (Task 2-2)
Rotary-Wing Blade Removed (Task 5-64)



NOTE

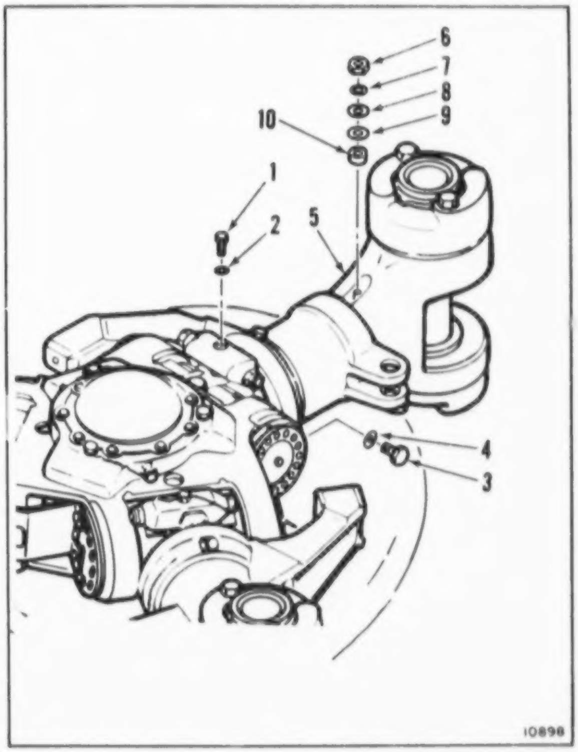
- **Remove pitch-varying housing only if the same housing will be installed. Installation of a replacement housing is not permitted at this level.**
- Procedure is same to remove any pitch-varying housing on forward or aft rotary-wing head except as noted. Forward head is shown here. Procedure may be done with head on or off helicopter.

1. Remove lockwire from filler plug (1). Remove plug and packing (2).
2. Remove lockwire from lower plug (3). Remove plug and packing (4).
3. **Drain oil.** Use container and cloth (E120). Raise pitch housing (5).

NOTE

Balance weights are not installed on red housing.

4. **Remove** nut (6), washer (7), and **balance weights (8, 9, and 10)** from pitch housing (5).



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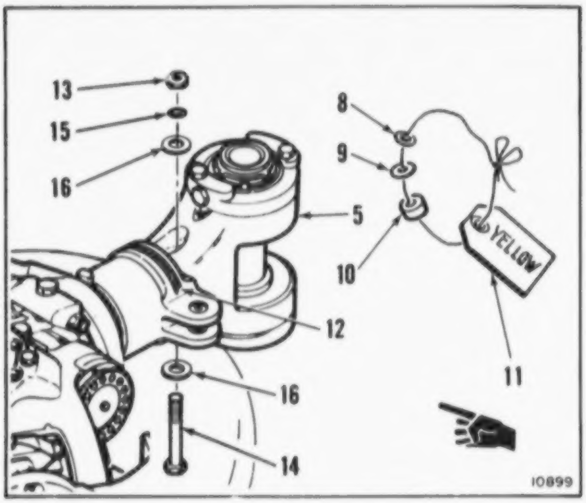
5-22 REMOVE PITCH VARYING HOUSING (Continued) 5-22

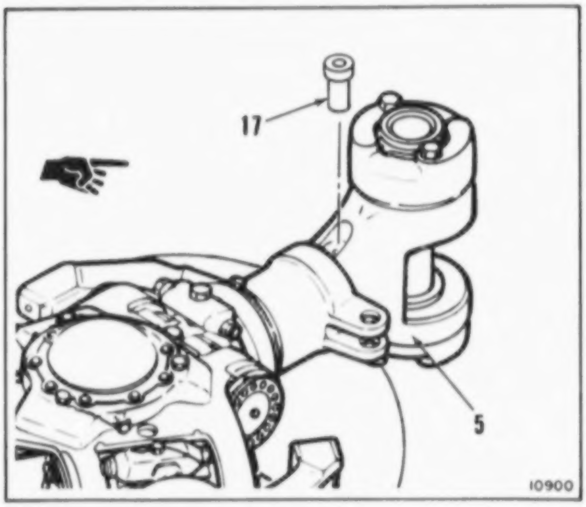
5. Tie weights (8, 9, and 10) together with tag (E264) (11). Mark tag with color of tape (12) (E404) on housing (5).
6. **Remove** nut (13), **bolt (14),** and washer (15).
7. Remove two washers (16). Pry washers loose from sealant.



CAUTION

Do not try to tap tie-bar pin out through bottom of housing. Damage to pin and tie-bar will result.

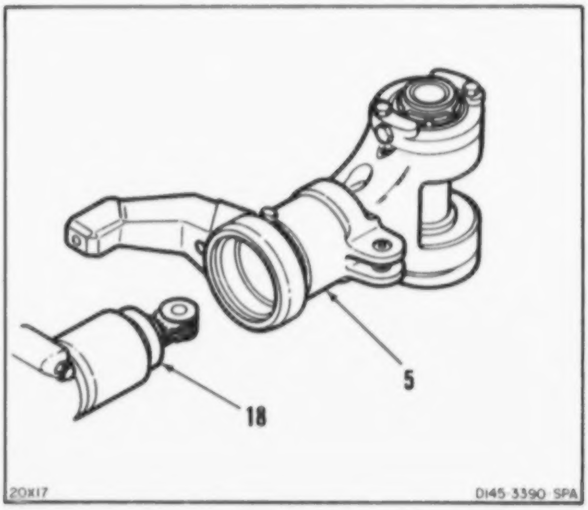
8. **Tap tie-bar pin (17)** upward **out of housing (5). Use phenolic drift.**



CAUTION

Do not allow dirt or abrasive materials to contact bearing races. Avoid handling pitch-varying shaft. Fingerprints can cause corrosion on bearing surfaces.

9. **Pull housing (5) from shaft (18).** Tap housing with soft mallet if needed.



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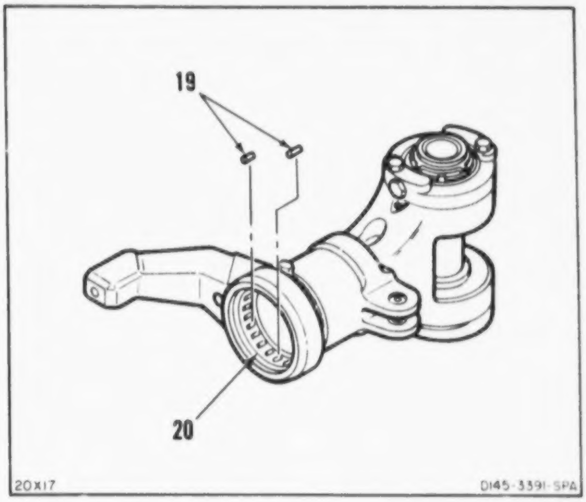
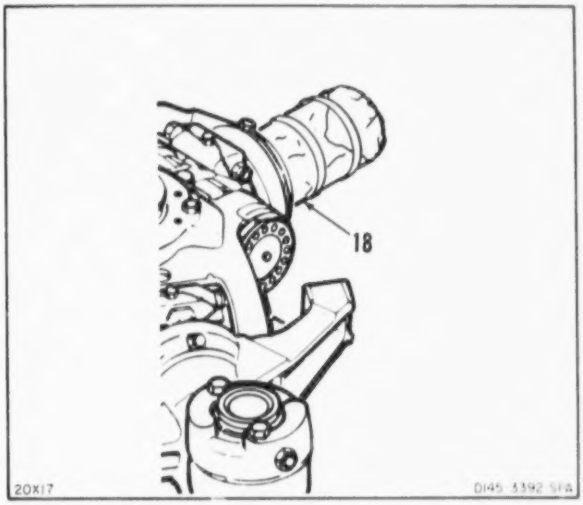
NOTE

Worn bearing cage, which permits rollers to be loose or to fall out, is not cause for replacement.

10. If bearing rollers (19) fall from cage (20), clean and **place rollers back in cage.** Apply thin coat of grease (E190) over rollers to hold them in cage.



11. Cover pitch shaft (18). Use barrier material (E80) and tape (E388).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-23 INSTALL PITCH VARYING HOUSING 5-23

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Torque Wrench, 5 to 50 Inch-Pounds
Crowfoot, 7/16-Inch

Materials:
Grease (E190)
Oil (E254)
Antiseize Compound (E75)
Methyl-Ethyl-Ketone (E244)
Sealant (E336)
Cloth (E120)
Dry Cleaning Solvent (E162)
Lockwire (E231)
Gloves (E186)

Parts:
Packings

Personnel Required:
Aircraft Powertrain Repairer (2)
Inspector

References:
TM 55-1520-240-23P
Task 1-57

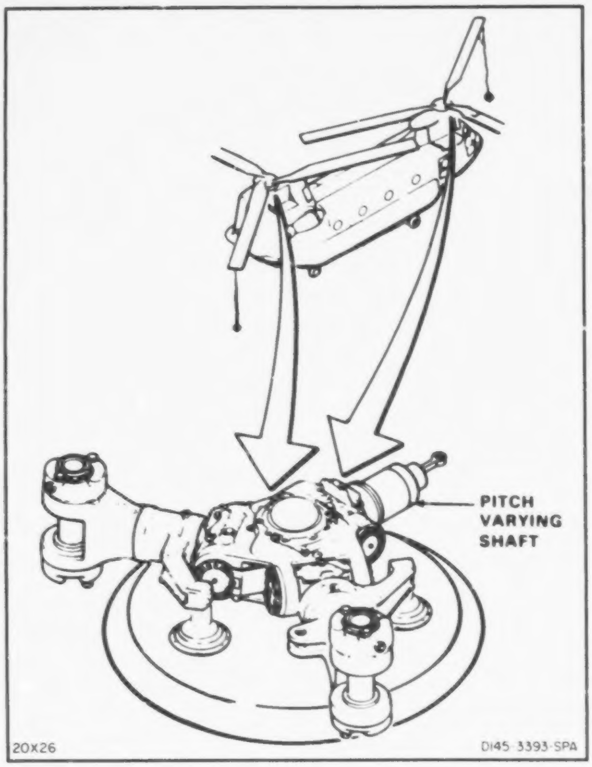
General Safety Instructions:

WARNING

Dry cleaning solvent (E162) and methyl-ethyl-ketone (E244) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, and clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



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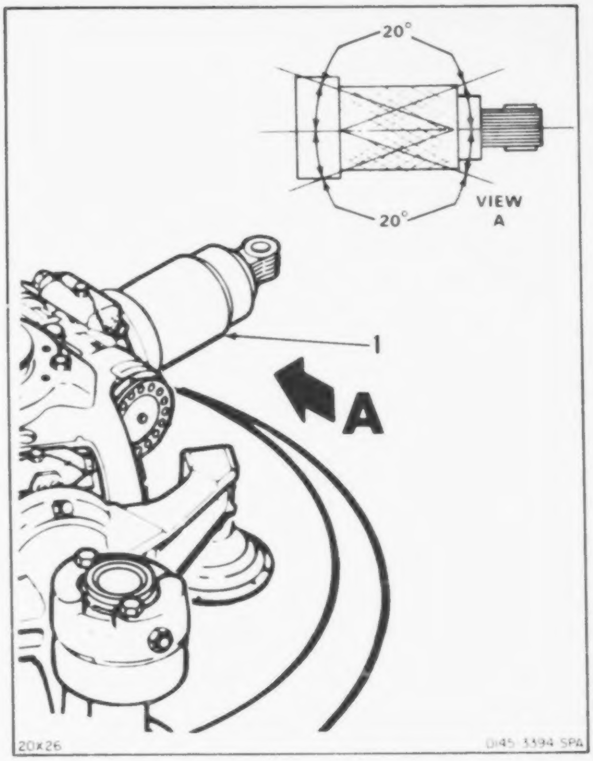
5-23 INSTALL PITCH VARYING HOUSING (Continued) 5-23

NOTE

- **Install pitch varying housing only if it is the same housing that was removed. Installation of a replacement housing is not permitted at this level.**
- Procedure is same to install any pitch varying housing on forward or aft head. Yellow housing on forward head is shown here.

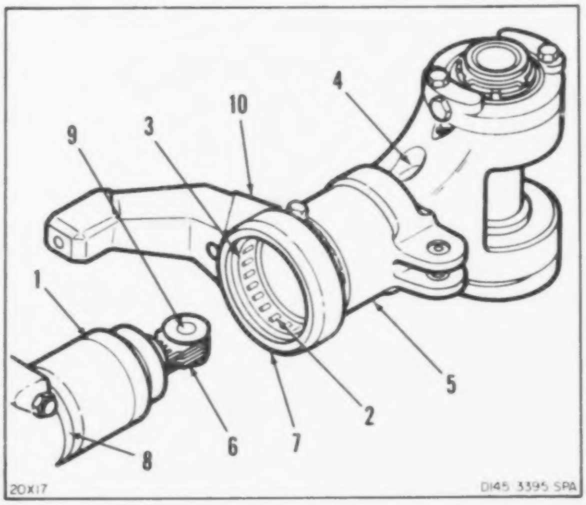
1. Remove barrier, material, and tape from pitch shaft (1). Clean pitch shaft. Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
2. **Check shaft (1) for scores, nicks, or gouges.** Damage shall not exceed 0.005 inch in depth by 2.5 inches in length. Damage direction in View A shall not exceed 20 degrees from shaft centerline.



CAUTION

Do not allow dirt or abrasive materials to contact bearing races. Avoid handling pitch varying shaft. Fingerprints can cause corrosion on bearing surfaces.

3. Check that rollers (2) are in cages (3). Apply thin coat of grease (E190) to hold rollers in place, if needed.
4. Apply light coat of lubricating oil (E254) to shaft (1).
5. Clean sealant from two holes (4) in pitch housing (5). Use methyl-ethyl-ketone (E244). Wear gloves (E186).



CAUTION

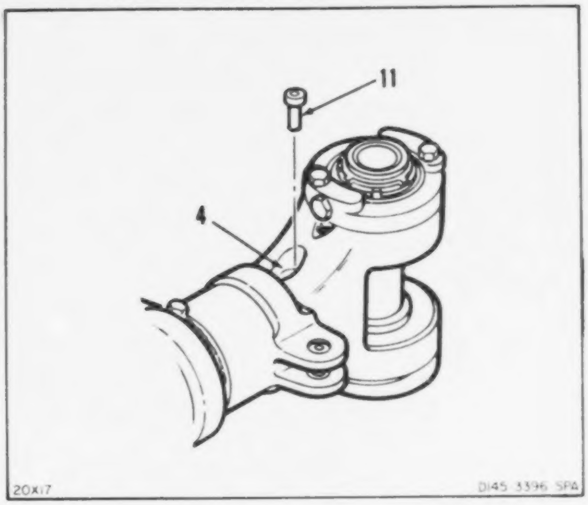
Do not allow seals to contact tie-bar during pitch housing installation. Sharp edges of tie-bar can damage seals.

6. **Install housing (5)** over tie-bar (6) and shaft (1).
7. Guide seal (7) onto wear sleeve (8). Seal shall not be folded.
8. Align hole (9) in tie-bar (6) with hole (4) in housing (5). Use pitch arm (10) to guide housing.

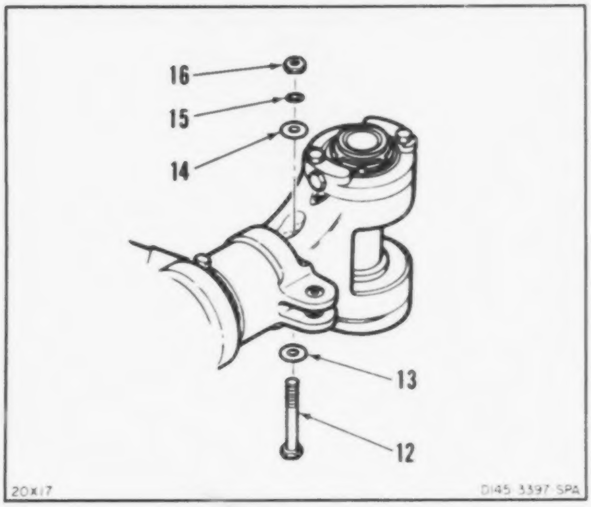
GO TO NEXT PAGE

5-23 INSTALL PITCH VARYING HOUSING (Continued) 5-23

9. Apply light coat of anti-seize (E75) to tie-bar pin (11). Wear gloves (E186).
10. **Install pin (11)** in hole (4). Tap pin to seat it.


11
4
20x17
D145 3396 SPA

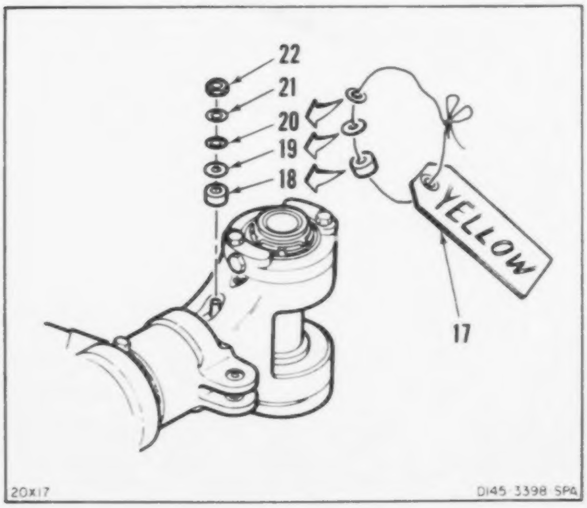
11. Install bolt (12), washers (13, 14, and 15), and nut (16). **Torque nut to 35 inch-pounds.**
12. Apply sealant (E336) around washers (13 and 14). Wear gloves (E186).


16
15
14
13
12
20x17
D145 3397 SPA

CAUTION

Do not install wrong balance weights on a pitch housing. Use of wrong balance weights will cause head to be unbalanced.

13. Remove tag (17). **Install weights (18, 19, and 20),** washer (21) and nut (22). **Torque nut to 35 inch-pounds.**


22
21
20
19
18
YELLOW
17
20x17
D145 3398 SPA

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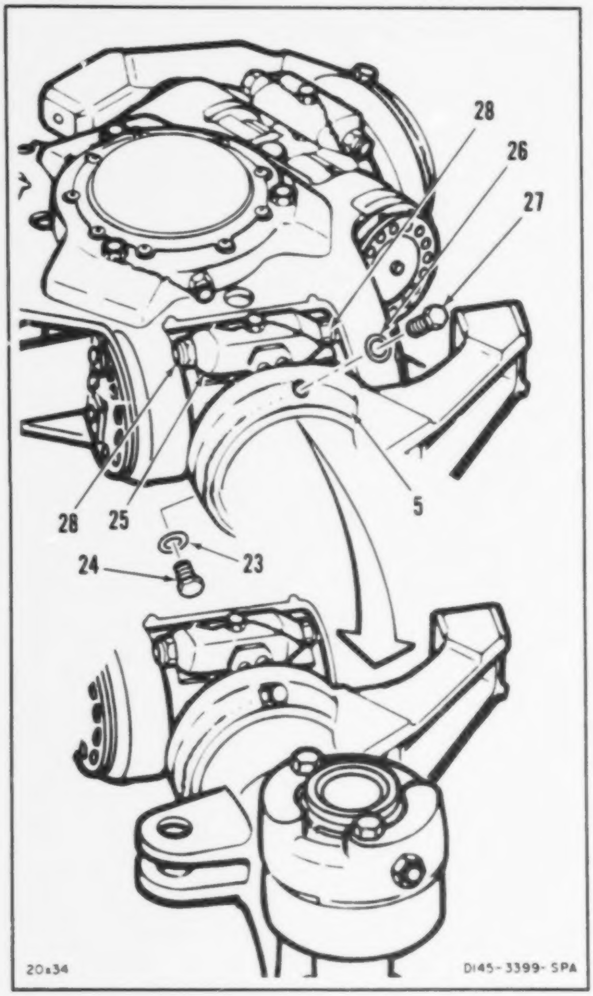
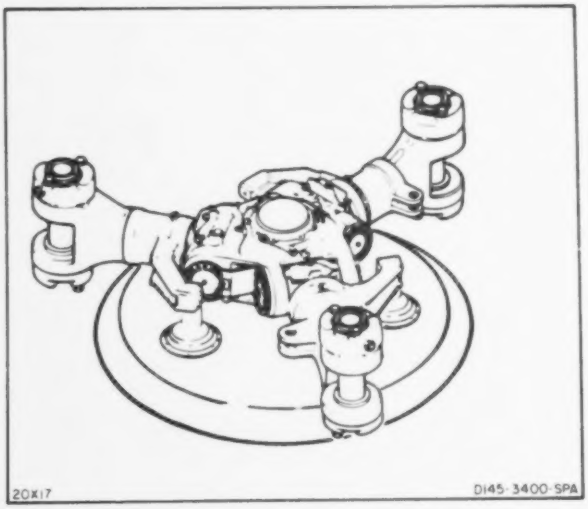
14. **Install** packing (23) and **lower plug (24)** on housing (5). **Torque plug to 24 inch-pounds.**
15. **Service pitch bearing oil tank (25)** until oil reaches top of housing (5) (Task 1-57).
16. **Install** packing (26) and **upper plug (27). Torque plug to 24 inch-pounds.** Lockwire plug to lower plug (24). Use lockwire (E231).
17. Continue servicing pitch bearing oil tank (25) until oil reaches center of sight indicators (28) (Task 1-56).

INSPECT



FOLLOW-ON MAINTENANCE:

Pressure test rotary-wing head (Task 5-5).
Install rotary-wing blade (Task 5-84).
Close work platform (Task 2-2).



END OF TASK

5-23.1 REMOVE ROTARY-WING HEAD TIE BAR ASSEMBLY 5-23.1

INITIAL SETUP

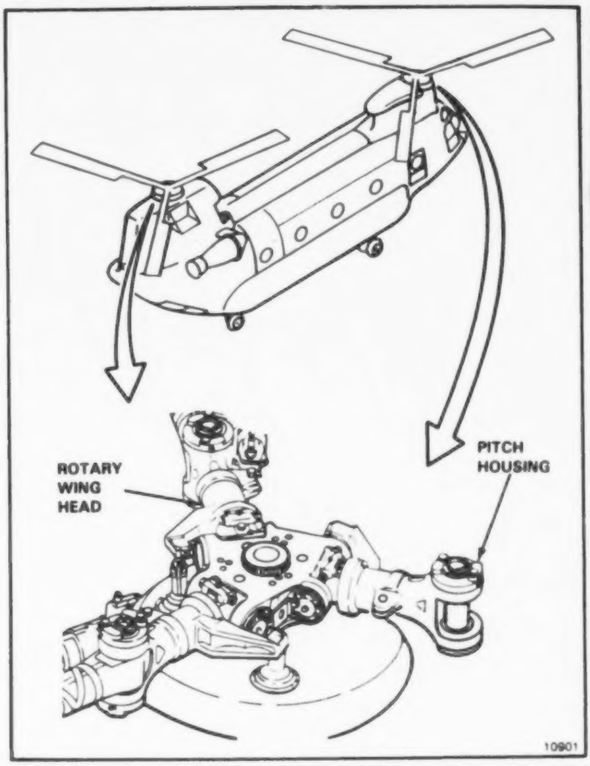
Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-323-5267
Two-Quart Container
Bolt, 3/8-24 X 5 Inches
Drift, Phenolic, 3/8-Inch Dia.

Materials:
Tags (E264)

Personnel Required:
Aircraft Powertrain Repairer (2)

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied Down (Task 1-26)
Work Platform Open (Task 2-2)
Rotary-Wing Blade Removed (Task 5-64)
Hub Oil Tank Removed (Task 5-15)



NOTE

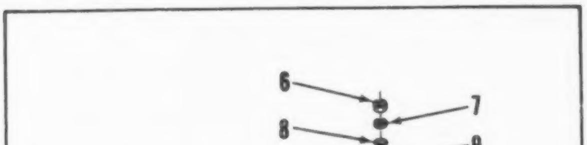
Procedure is same to remove any tie bar assembly. Removal of tie bar assembly from forward rotary-wing head is shown here.

1. Remove lockwire from filler plug (1). Remove plug and packing (2).
2. Remove lockwire from lower plug (3). Remove plug and packing (4).
3. **Drain oil.** Use container and cloth (E120). Raise pitch housing (5).

NOTE

Red pitch housing does not have weights.

4. **Remove** nut (6), washer (7), and **balance weights (8, 9, and 10)** from pitch housing (5).
5. Tie weights (8, 9, and 10) together and tag (E264). Mark tag with color of tape (11) on housing (5).
6. **Remove** nut (12), washer (13), and **bolt (14)** from housing (5). Pry washer loose from sealant.



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5-23.1 REMOVE ROTARY-WING HEAD TIE BAR ASSEMBLY (Continued) 5-23.1

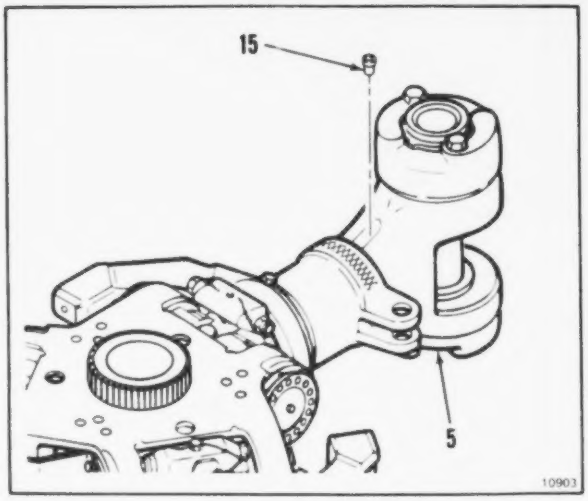
CAUTION

Do not try to tap tie-bar pin out through bottom of housing. Damage to pin and tie-bar will result.

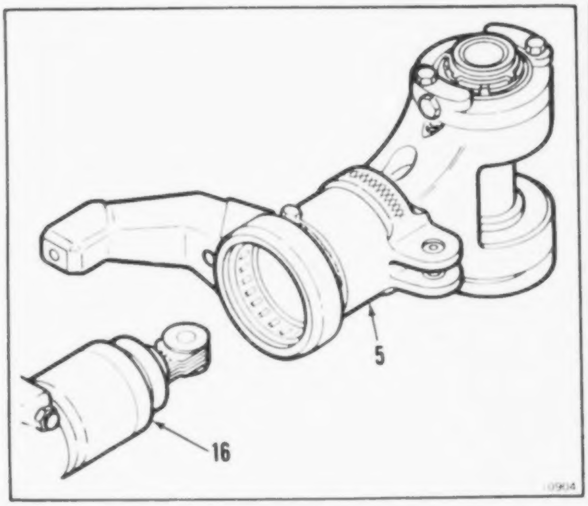
7. **Tap tie-bar pin (15)** upward **out of housing (5). Use phenolic drift.**

CAUTION

Do not allow dirt or abrasive materials to contact bearing races. Avoid handling pitch-varying shaft. Fingerprints can cause corrosion on bearing surfaces.



8. **Pull housing (5) from shaft (16).** Tap housing with soft mallet if needed.

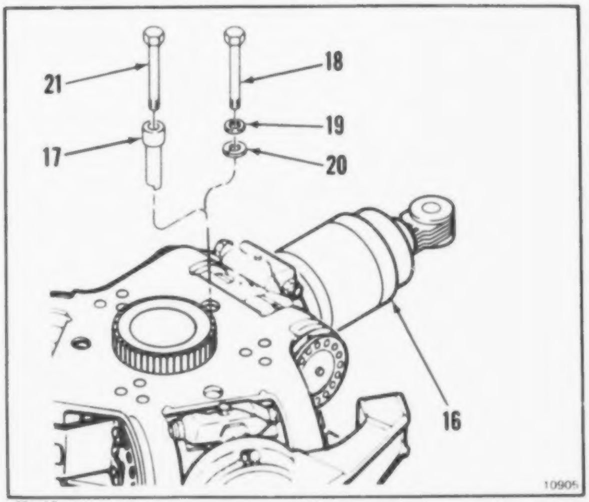


9. Remove lockwire from tie-bar pin (17). Remove bolt (18), washer (19), and retaining washer (20).

CAUTION

Do not tap pin down to remove. Retaining bolt nut plate will be damaged.

10. Install 3/8 inch-24 thread x 5 inch bolt (21) in pin (17) and pull pin from shaft (16).
11. Remove bolt (21) from pin (17).



20 x 17

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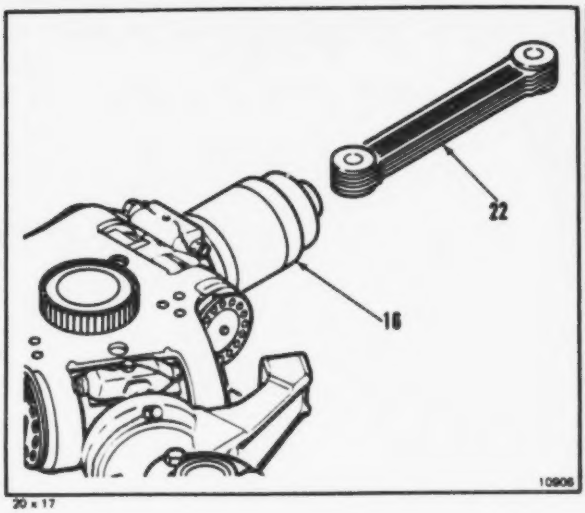
5-23.1 REMOVE ROTARY-WING HEAD TIE BAR ASSEMBLY (Continued) 5-23.1

12. Pull tie bar (22) from shaft (16).



20 x 17

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-23.2 INSTALL ROTARY-WING HEAD TIE BAR ASSEMBLY 5-23.2

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit,
NSN 5180-00-323-5267
Torque Wrench, 5 to 50 Inch-Pounds
Bolt, 3/8-Inch-24 Thread X 5 Inches
Drift, Phenolic, 3/8-Inch Dia.

Materials:

Cloths (E120)
Antiseize Compound (E75)
Lockwire (E231)
Gloves (E186)
Sealant (E336)
Solvent (E244)
Grease (E190)
Oil (E254)

Parts:

Packings

Personnel Required:

Aircraft Powertrain Repairer (2)
Inspector

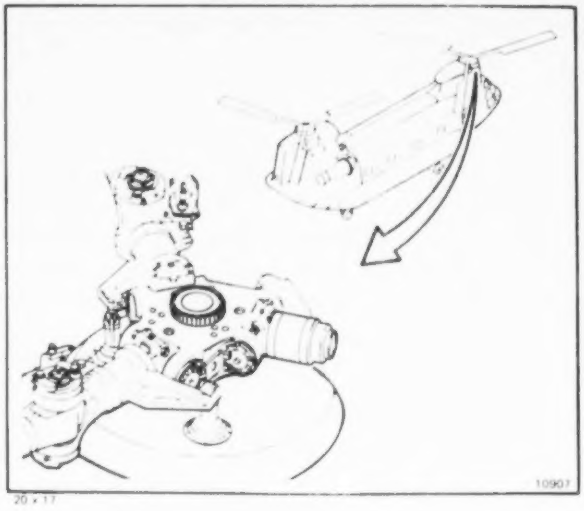
References:

TM 55-1520-240-23P
Task 1-56

General Safety Instructions:

WARNING

Methyl-ethyl-ketone (E244) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, and clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Antiseize compound (E75) can form toxic vapors if exposed to flame. Use in well-ventilated area, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

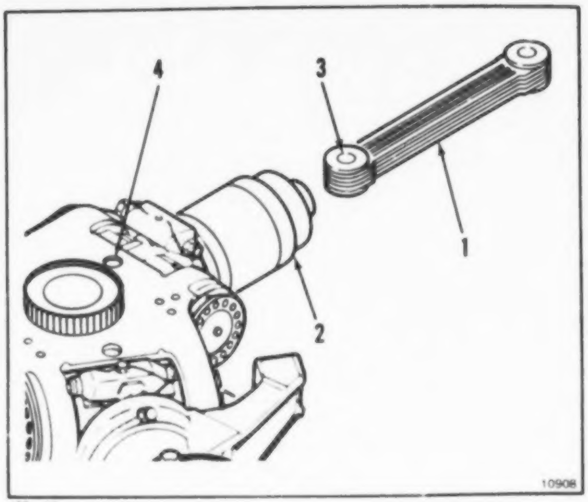
GO TO NEXT PAGE

5-23.2 INSTALL ROTARY-WING HEAD TIE BAR ASSEMBLY (Continued) 5-23.2

NOTE

Procedure is same to install any tie bar assembly. Installation of tie bar assembly in forward rotary-wing head is shown here.

1. Slide tie bar (1) into shaft (2). Align hole (3) in tie bar with hole (4) in shaft.



20 x 17

2. Install 3/8 inch-24 thread x 5 inch bolt (5) in pin (6).
3. Apply light coat of compound (E75) to pin (6). Wear gloves (E186).

CAUTION

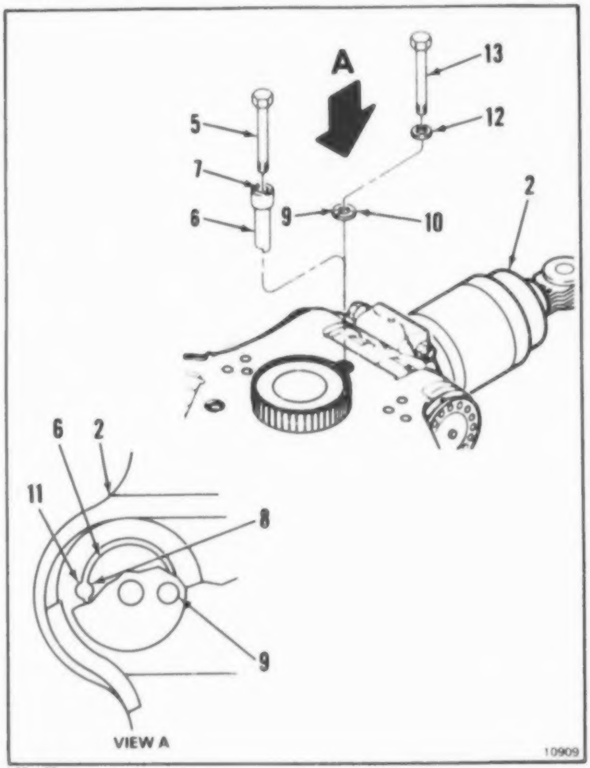
Do not misalign tie bar pin during installation. Rotary-wing head will be damaged at maximum flap angle. Nut plate at pitch shaft will also be damaged.

4. Position pin (6) with slot (7) in pin aligned with slot (8) in shaft (2). Install pin.
5. Remove bolt (5) from pin (6).
6. Align pins (9) of retaining washer (10) with slots (11) of pin (6). Install washer.

CAUTION

Do not use substitute bolt or washer. Damage to hub can result.

7. Install washer (12) and bolt (13) in shaft (2). Torque bolt to 40 inch-pounds. Lockwire bolt to washer (10).
8. Apply sealant (E336) to washer (10) and shaft (2).



20 x 26

INSPECT

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5-23.2 INSTALL ROTARY-WING HEAD TIE BAR ASSEMBLY (Continued) 5-23.2

CAUTION

Avoid handling pitch varying shaft. Fingerprints can cause corrosion on bearing surfaces.

9. Check rollers (14) are in position in housing (15). Apply thin coat of grease (E190) to hold rollers in place, if needed. Use gloves (E186).
10. Apply light coat of oil (E254) to outer surface of shaft (2). Wear gloves (E186).
11. Clean sealant from two holes (16) of housing (15). Use solvent (E244) and cloths (E120). Wear gloves (E186).

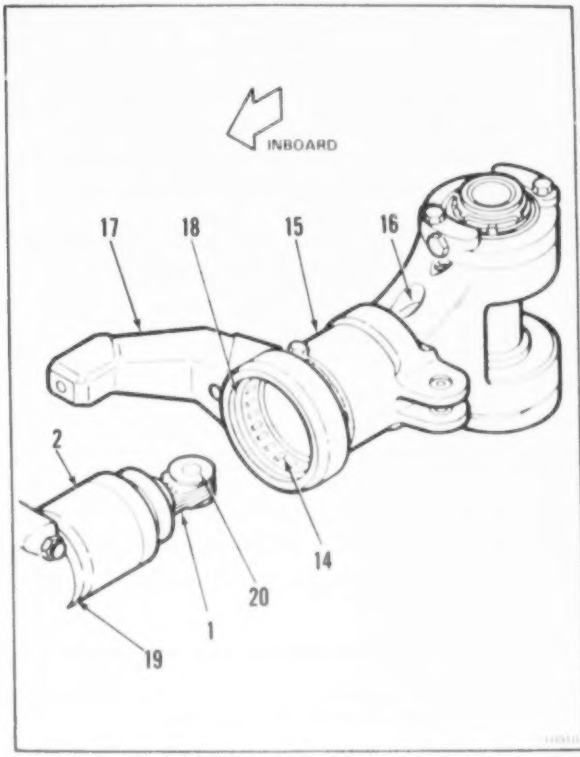
CAUTION

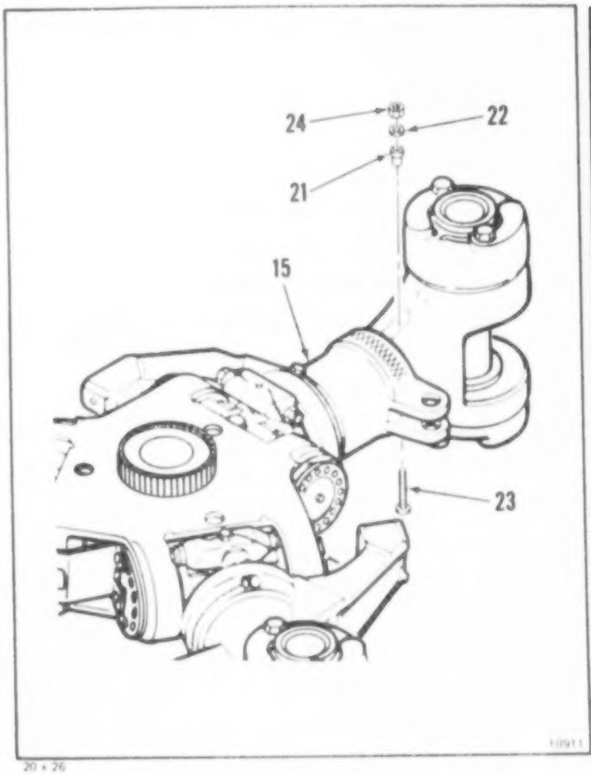
Do not allow seals to contact tie bar during pitch housing installation. Sharp edges of tie bar can damage seals.

12. Slide housing (15) onto shaft (2) and tie bar (1), pitch arm (17) to right looking inboard. Guide seal (18) onto wear sleeve (19). Seal shall not be folded.

INSPECT

13. Align hole (20) in tie bar (1) with hole (16) in housing (15).
14. Apply light coat of compound (E75) to pin (21). Wear gloves (E186).
15. Install pin (21) in housing (15). Tap to seat pin. Use phenolic drift.
16. Install washer (22), bolt (23), and nut (24) in housing (15). Torque nut to 35 inch-pounds.
17. Apply sealant (E336) to washer (22) and housing (15). Wear gloves (E186).





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5-23.2 INSTALL ROTARY-WING HEAD TIE BAR ASSEMBLY (Continued) 5-23.2

CAUTION

Do not install wrong balance weights on a pitch housing. Use of wrong balance weights will cause head to be unbalanced.

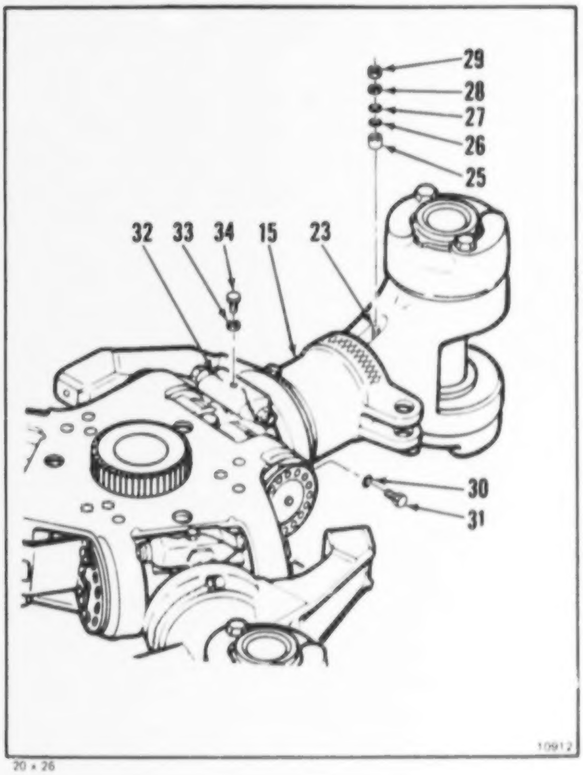
18. Remove tag from three weights (25, 26, and 27). Install weights, washer (28), and nut (29) on bolt (23). Torque nut to 35 inch-pounds.

NOTE

Color of tape on housing must be same as color marked on tag.

19. Install packing (30) on plug (31).
20. Install plug (31) in housing (15). Torque plug to 24 inch-pounds. Lockwire (E231) plug to housing.
21. Service pitch bearing oil tank (32) (Task 1-56).
22. Install packing (33) on plug (34).
23. Install plug (34) in tank (32). Torque plug to 24 inch-pounds. Lockwire plug to tank. Use lockwire (E231).

INSPECT



FOLLOW-ON MAINTENANCE:

Pressure test rotary-wing head (Task 5-5).

Install rotary-wing blade (Task 5-84)

Close work platform (Task 2-2).

Remove tiedown lines from aft and forward blades (Task 1-26).

Install Hub Oil Tank (Task 5-17).

END OF TASK

5-24 REMOVE PITCH HOUSING SEALS 5-24

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267

Outboard Seal Puller (T8)

Seal Removal Tool (Appx E-2)

Materials:

Grease (E190)

Dry Cleaning Solvent (E162)

Gloves (E186)

Cloths (E120)

Personnel Required:

Aircraft Powertrain Repairer (2)

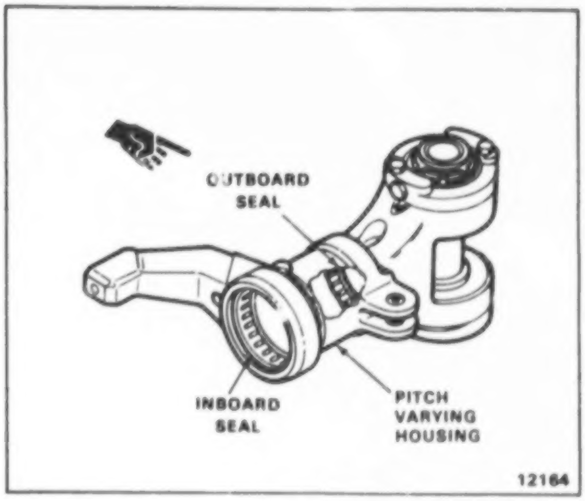
References:

Appendix E

Equipment Condition:

Off Helicopter Task

Pitch Varying Housing Removed from Rotary-Wing Head (Task 5-22)

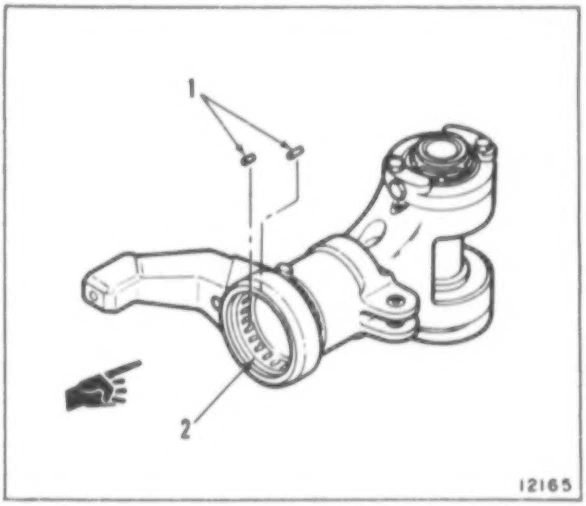


WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

- Procedure is same to remove seals from all six pitch varying housings.
- Bearing cage wear which permits roller bearings to be loose or to fall out, is not cause for cage replacement.

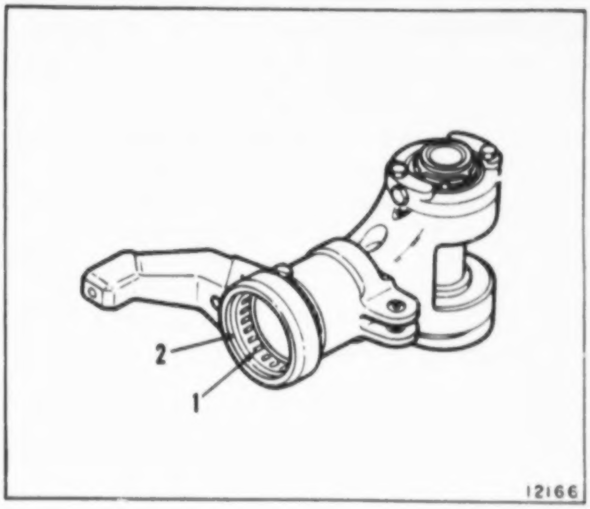


1. **Clean roller bearings (1) that fall from cage (2).** Use cloth (E120) damp with solvent (E162). Use gloves (E186).

GO TO NEXT PAGE

5-24 REMOVE PITCH HOUSING SEALS (Continued) 5-24

2. Apply thin coat of grease (E190) to bearings (1) to hold them in cage (2). **Position bearings** in cage.

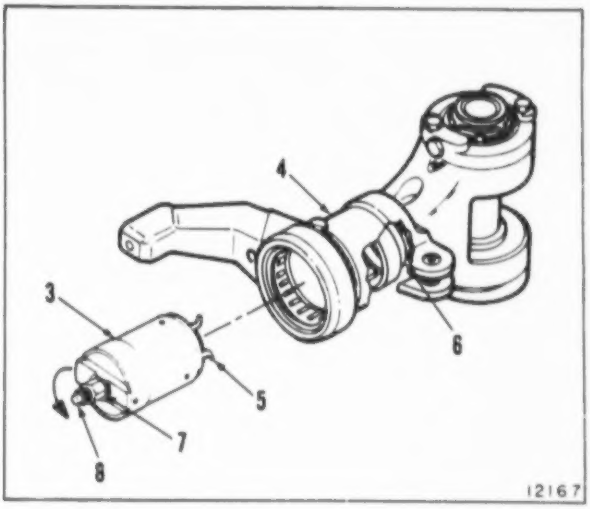


CAUTION

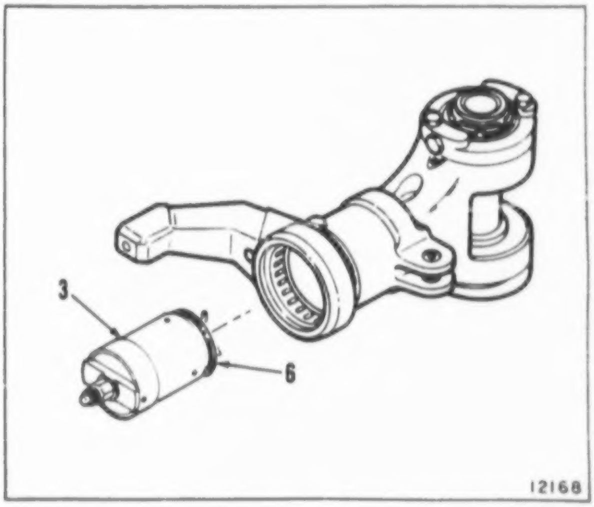
Seal Puller (T-8) utilizes a set of fingers/jaws P/N 114E5809-3 for seal removal and a set of finger jaws P/N 114E5809-15 for bearing removal. Ensure fingers/jaws P/N 114E5809-3 are installed in puller to preclude damaging the outboard bearing.

REMOVE OUTBOARD SEAL

3. **Position seal puller (T8) (3) in housing (4)** deep enough to allow fingers (5) to grasp seal (6).
4. Hold nut (7) and turn shaft (8) counterclockwise until fingers (5) **unseat seal (6).** Use wrench to prevent nut from turning.



5. **Remove** puller (T8) (3) and **seal (6).**



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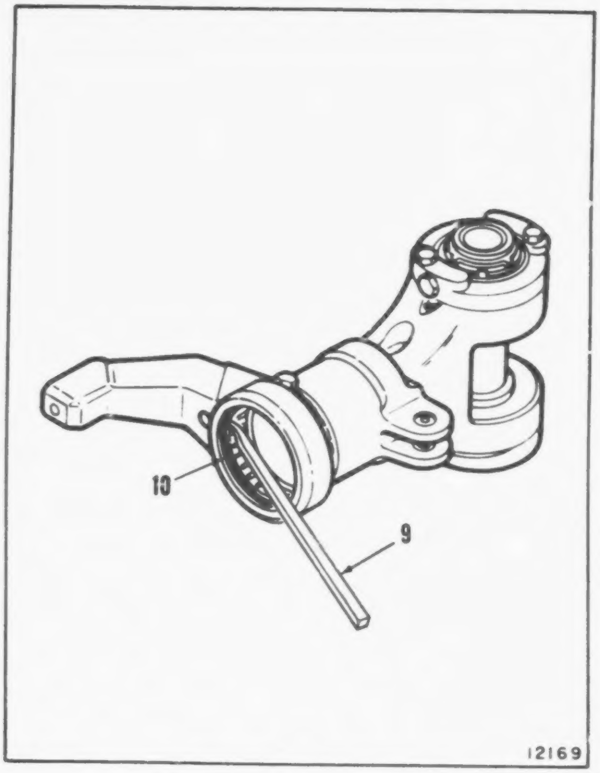
5-24 REMOVE PITCH HOUSING SEALS (Continued) 5-24

REMOVE INBOARD SEAL

CAUTION

Do not pry seal from housing with screwdriver or other hard tool. Damage to housing will result.

6. Hook seal removal tool (9) behind inboard seal (10). Exert steady pressure against end of tool to loosen seal. Remove seal.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-24.1 INSPECT PITCH VARYING HOUSING SEAL SURFACES 5-24.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Technical Inspection Tool Kit, NSN 5180-00-323-5114

Materials:

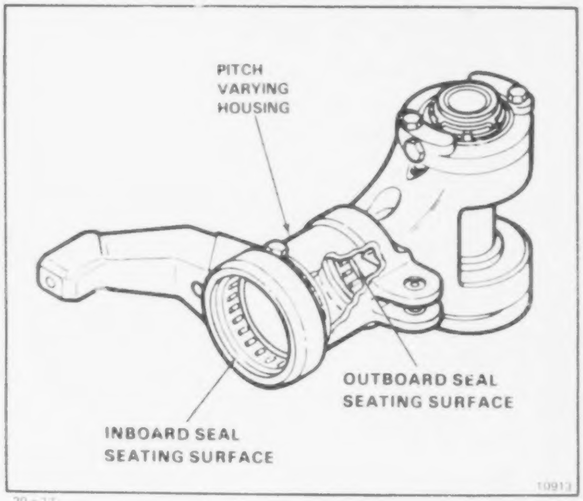
Alodine (E65)
Gloves (E186)
Wash Primer (E302)
Zinc Chromate Primer (E291)
Abrasive Paper (E10)
Tape (E388)
Solvent (E162)
Cloths (E120)

Personnel Required:

Aircraft Powertrain Repairer
Inspector

Equipment Condition:

Off Helicopter Task


PITCH
VARYING
HOUSING
OUTBOARD SEAL
SEATING SURFACE
INBOARD SEAL
SEATING SURFACE
10913

20 • 11

GO TO NEXT PAGE

5-24.1 INSPECT PITCH VARYING HOUSING SEAL SURFACES (Continued) 5-24.1

1. **Inspect pitch-varying housing (1)** at seal seating surfaces (2). Nicks, gouges and scratches shall not exceed 0.010 inch in depth.
2. Blend out surface defects as follows:

   a. Protect surfaces around area to be repaired. Use tape (E388).

   CAUTION

   Do not contaminate bearings. Dirt can damage bearing surfaces.

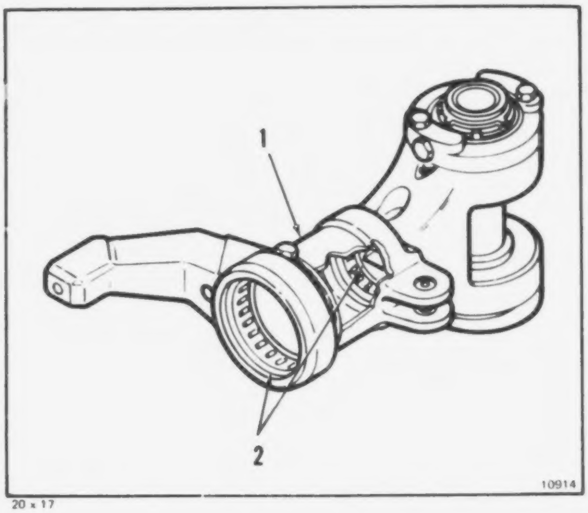
   b. Blend out damage to surface, at least 10 times as wide as damage. Do not blend deeper than damage. Use abrasive paper (E10).

   WARNING

   Solvent (E162) is flammable toxic and can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

   c. Clean reworked area. Use cloth (E120) moist with solvent (E162). Wear gloves (E186).

INSPECT



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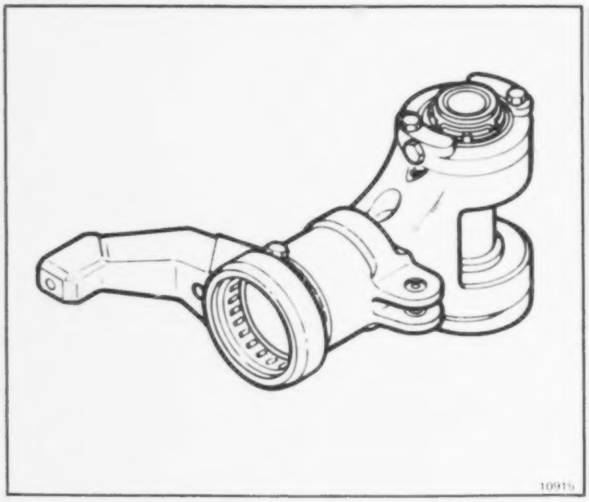
5-24.1 INSPECT PITCH VARYING HOUSING SEAL SURFACES (Continued) 5-24.1



WARNING

Alodine (E65) is an oxidizer. Discard cloths which contain this material in a separate container. If discarded with cloths contaminated with acetone, mek, or other organic solvents, combustion can result. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

d. Apply alodine (E65) to repaired area. Wear gloves (E186).

WARNING

Wash primer (E302) and zinc chromate primer (E291) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

e. Apply one coat of wash primer (E302) to repaired area. Allow primer to dry for 30 minutes. Wear gloves (E186).

f. Apply one coat of primer (E291) to repaired area. Allow primer to dry for 30 minutes. Wear gloves (E186).

g. Remove tape (E388).

INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-25 INSTALL PITCH HOUSING SEALS 5-25

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Outboard Seal Installation Drift (T11)
Inboard Seal Installation Drift (E56)
Rawhide Mallet

Materials:
Dry Cleaning Solvent (E161)
Dry Cleaning Solvent (E162)
Gloves (E186)
Cloth (E120)
Methyl-Ethyl-Ketone (E244)
Zinc Chromate Primer (E291)
Adhesive (E63.1)
Grease (E190)

Personnel Required:
Aircraft Powertrain Repairer (2)
Inspector

References:
TM 55-1520-240-23P
Task 5-24.1

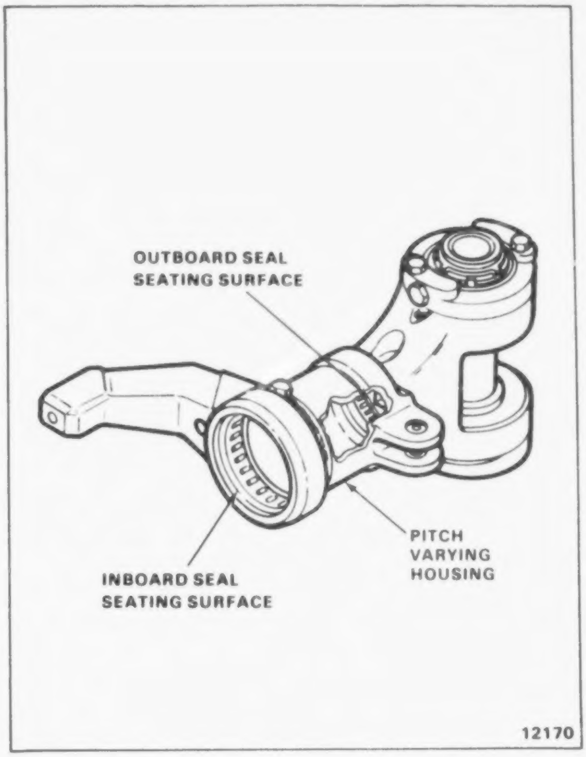
General Safety Instructions:

WARNING

Methyl-ethyl-ketone (E244), zinc chromate primer (E291), and dry cleaning solvents (E162) and (E161) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Adhesive (E63.1) can irritate skin and cause burns. Avoid contact with skin, eyes, and clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



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5-25 INSTALL PITCH HOUSING SEALS (Continued) 5-25

NOTE

Task is same to install seals in all six pitch-varying housings.

1. **Clean inside of housing (1),** outboard of seal seat (2). Use cloth (E120) moist with solvent (E161). Wear gloves (E186).

CAUTION

Do not contaminate bearings. Dirt can damage bearing surfaces.

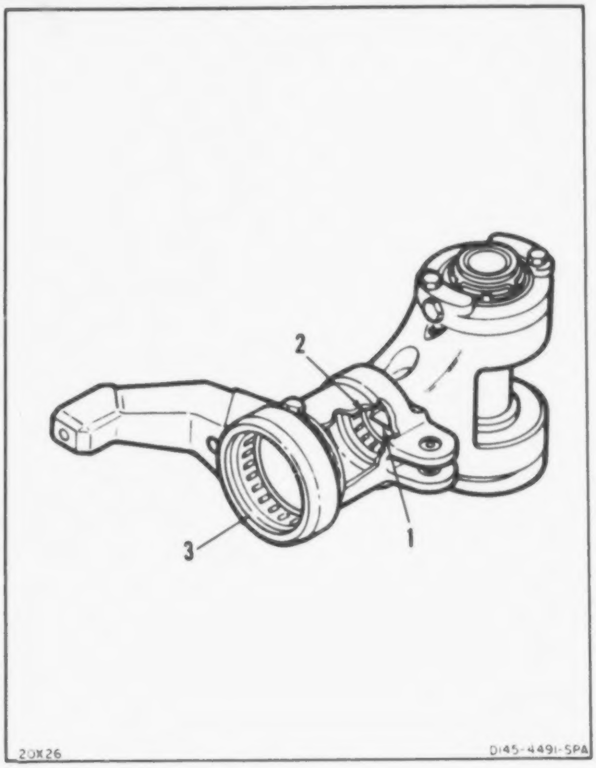
2. **Clean oil or dirt** from seal seats (2 and 3). Use cloth (E120) damp with methyl-ethyl-ketone (E244). Use gloves (E186).

CAUTION

Do not block drain hole. Oil can not drain freely if hole is blocked.

2.1 Inspect seats (2 and 3). (Task 5-24.1.)

3. Prime inside of housing (1), outboard of seal seat (2). Use zinc chromate primer (E291). Wear gloves (E186).

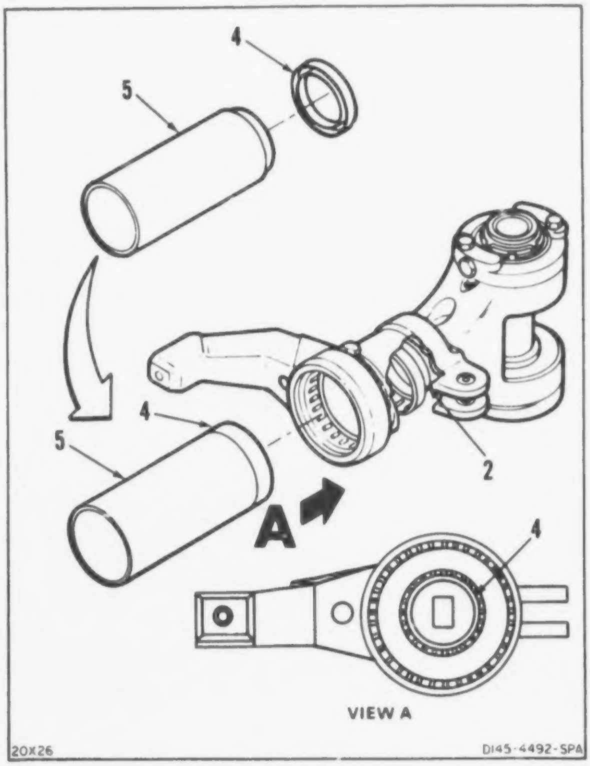


INSTALL OUTBOARD SEAL

CAUTION

Do not allow adhesive to contact bearing. Adhesive can adhere to bearing.

4. Apply adhesive (E63.1) to outboard seal seat (2).
5. Position outboard seal (4) on drift (T11) (5).
6. **Install outboard seal (4)** in seal seat (2). Remove drift (T11) (5).
7. Wipe off excess adhesive around outboard seal (4). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).



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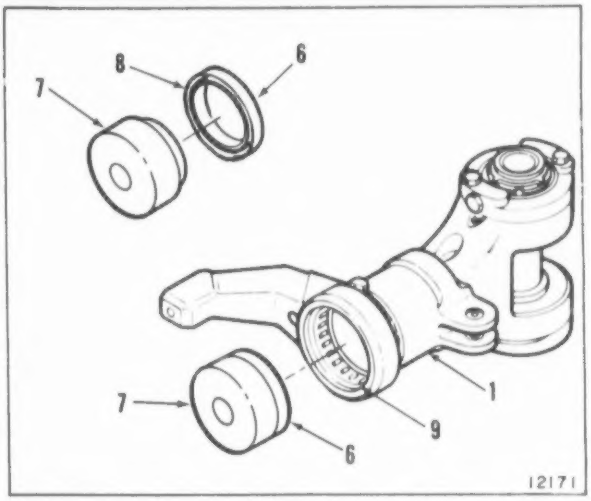
5-25 INSTALL PITCH HOUSING SEALS (Continued) 5-25

INSTALL INBOARD SEAL

8. Position inboard seal (6) on drift (E56) (7) with seal lips (8) toward drift.
9. Apply adhesive (E63.1) all around seal seat (9). Apply thin coat of adhesive (E63.1) around outside of inboard seal (6). Wear gloves (E186).
10. **Press inboard seal (6) into housing (1). Tap lightly with rawhide mallet if necessary.** Remove drift (7).

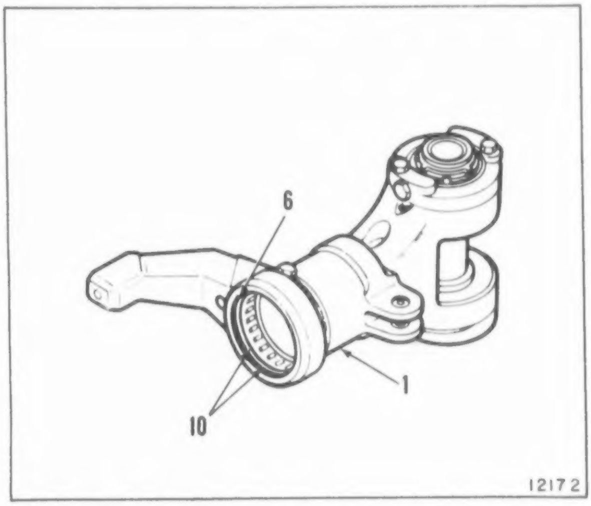


11. Apply bead of adhesive (E63.1) between inboard seal (6) and housing (1). Allow adhesive to cure for 6 hours. Wear gloves (E186).

CAUTION

Do not allow excess grease to remain on seals. Grease can plug oil holes and contaminate bearing oil.

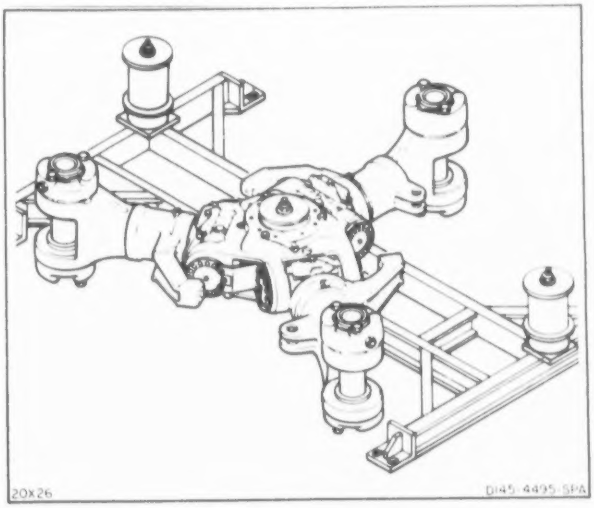
12. **Apply grease (E190) to seal lips (10).** Wipe off excess grease.



INSPECT

FOLLOW-ON MAINTENANCE:

Install pitch varying housing (Task 5-23).



END OF TASK

5-26 REMOVE WEAR SLEEVE 5-26

INITIAL SETUP

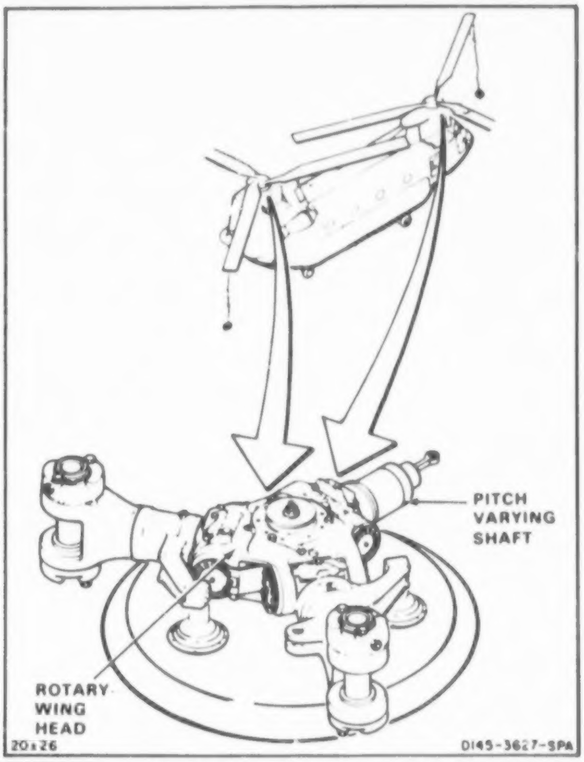
Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit,
NSN 5180-00-003-5267
Phenolic Drift

Materials:
None

Personnel Required:
Aircraft Powertrain Repairer (2)

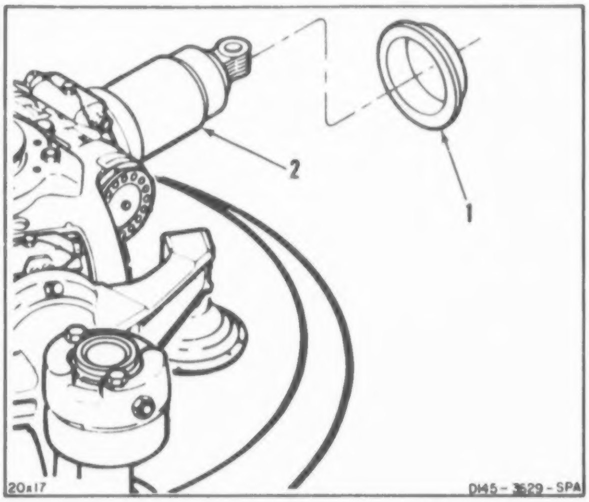
Equipment Condition:
Rotary Wing Blade Removed (Task 5-64)
Pitch Varying Housing Removed (Task 5-22)


PITCH
VARYING
SHAFT
ROTARY
WING
HEAD
20x26
D145-3627-SPA

NOTE

Procedure is same to remove wear sleeve from any housing of forward or aft head. Forward head is shown here.

1. **Remove wear sleeve (1)** from pitch shaft (2).
2. Use phenolic drift.


2
1
20x17
D145-3629-SPA

FOLLOW-ON MAINTENANCE:
None

END OF TASK

5-27 INSTALL WEAR SLEEVE 5-27

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Electric Heater, Gun Type
Pyrometer
Kevlar Gloves
Goggles
Rawhide Mallet

Materials:

Methyl-Ethyl-Ketone (E244)
Sealant (E336)
Cloths (E120)
Dry Cleaning Solvent (E162)
Gloves (E186)

Personnel Required:

Aircraft Powertrain Repairer (2)
Inspector

References:

TM 55-1520-240-23P

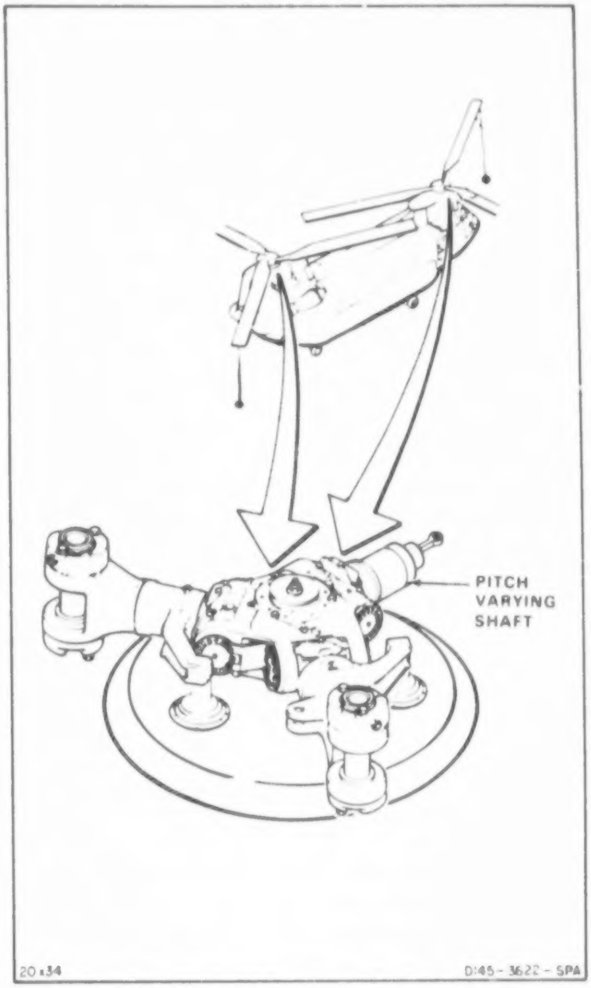
General Safety Instructions:

WARNING

Dry cleaning solvent (E162) and methyl-ethyl-ketone (E244) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, and clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



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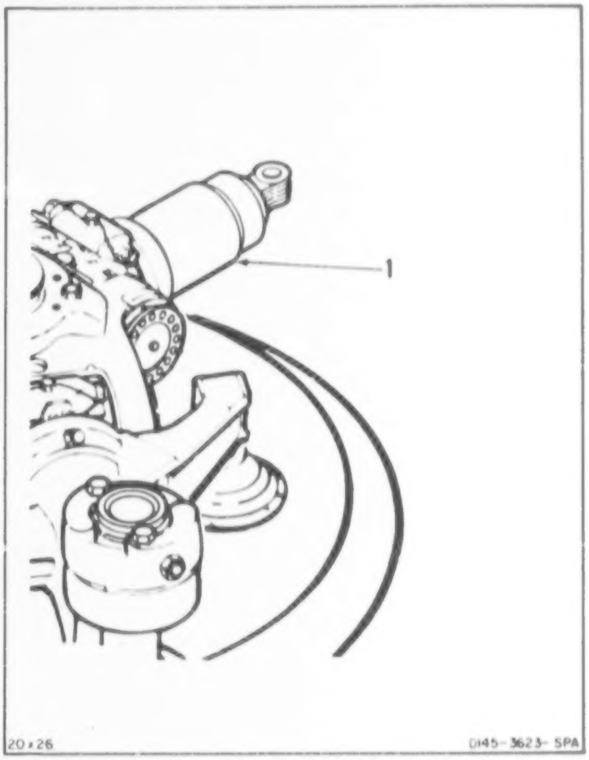
5-27 INSTALL WEAR SLEEVE (Continued) 5-27

NOTE

Procedure is same to install wear sleeve on any housing on forward or aft head. Forward head is shown here.

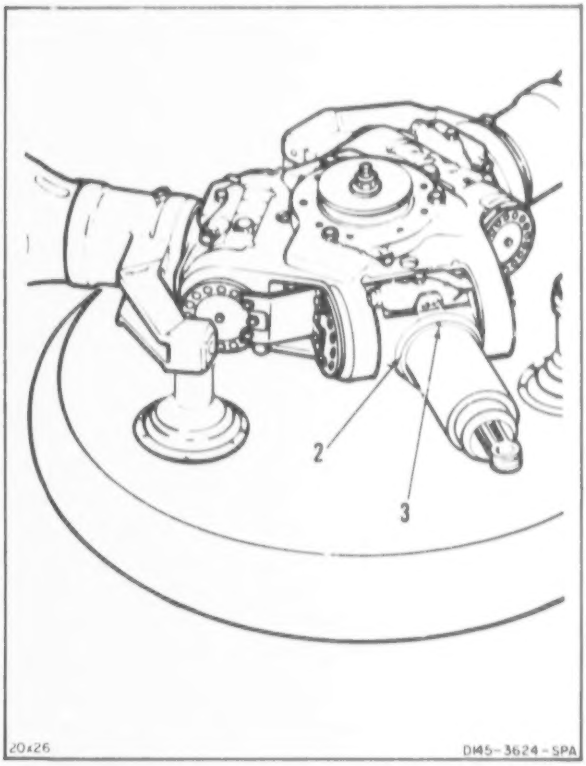
1. Remove old sealant from pitch shaft (1). Use methyl-ethyl-ketone (E244). Wear gloves (E186).
2. **Check shaft (1) for scores, nicks, or gouges.** Damage shall not exceed 0.005 inch in depth by 2.5 inches in length.



CAUTION

Do not block oil hole in pitch shaft. Sealant in oil hole will restrict oil flow to pitch housing.

3. **Apply sealant (E336) around pitch shaft shoulder (2). Check oil hole (3).** Oil hole shall not be blocked by sealant. Wear gloves (E186).



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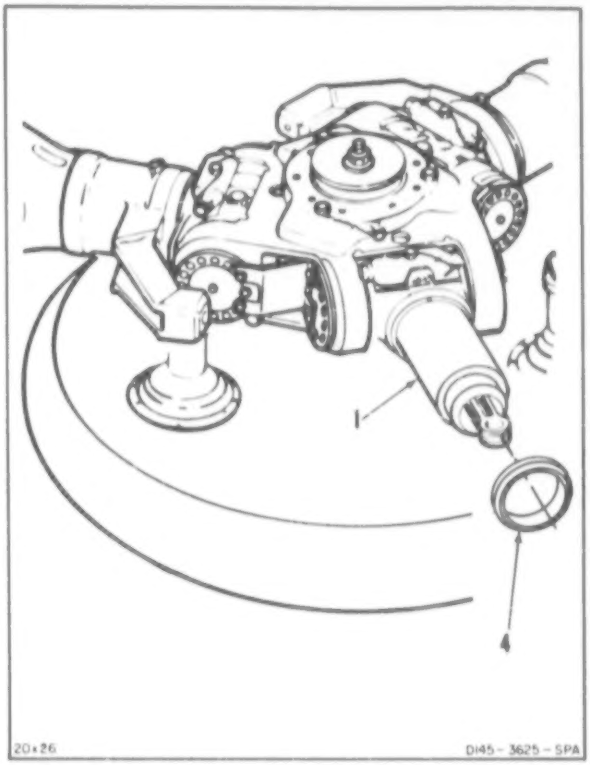
5-27 INSTALL WEAR SLEEVE (Continued) 5-27

4. **Remove protective coating from wear sleeve (4).** Use cloth (E120) damp with dry cleaning solvent (E162). Use goggles for eyes. Wear gloves (E186).

WARNING

Wear Kevlar gloves when handling heated parts.

5. **Heat wear sleeve (4) to 250°F (121°C).** Use heat gun and pyrometer.
6. **Install sleeve (4)** on shaft (1). Sleeve shall be seated all around shaft. Use rawhide mallet if needed.

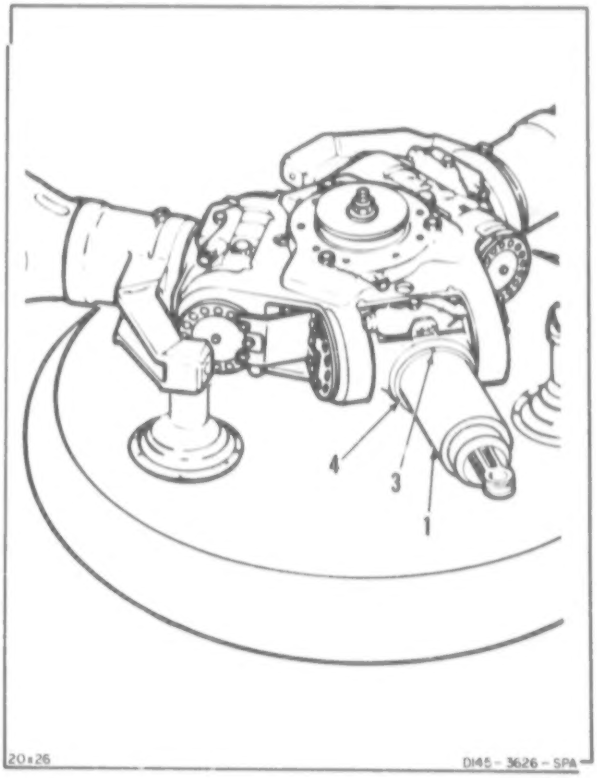


7. Wipe excess sealant from shaft (1) and sleeve (4). Use cloth (E120) damp with solvent (E162). Use goggles for eyes. Make sure oil hole (3) is clear of sealant. Wear gloves (E186).

INSPECT

FOLLOW-ON MAINTENANCE:

Install pitch varying housing (Task 5-23).
Install rotary wing blade (Task 5-84).



END OF TASK

5-28 REMOVE VERTICAL HINGE PIN OIL TANKS 5-28

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267

Container, Two-Quart

Wood Block, 2 x 3 x 24 Inches

Materials:

Cloth (E120)

Parts:

Packings

Personnel Required:

68D10 Aircraft Powertrain Repairer

68D20 Aircraft Powertrain Repairer

Equipment Condition:

Battery Disconnected (Task 1-39)

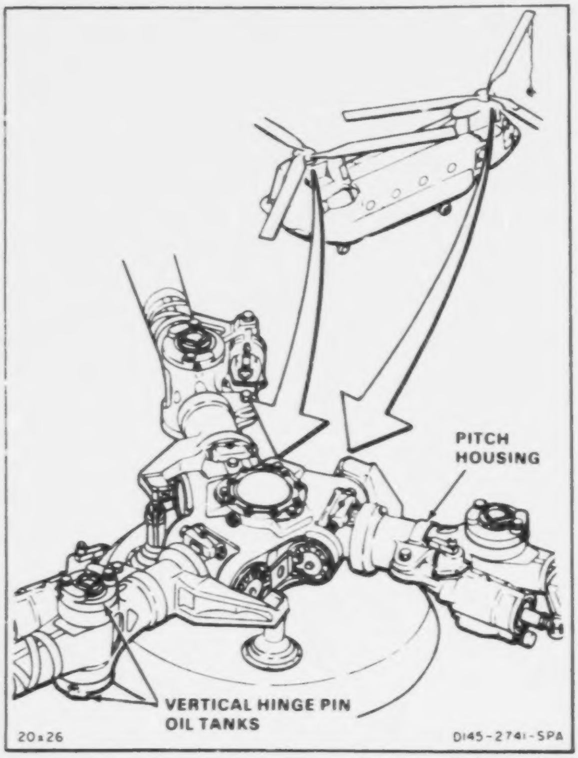
Electrical Power Off

Hydraulic Power Off

Forward Rotor Blade Tied-Down (Task 1-26)

Work Platform Open (Task 2-2)

Vertical Hinge Pin Nuts Removed (Task 5-64)



NOTE

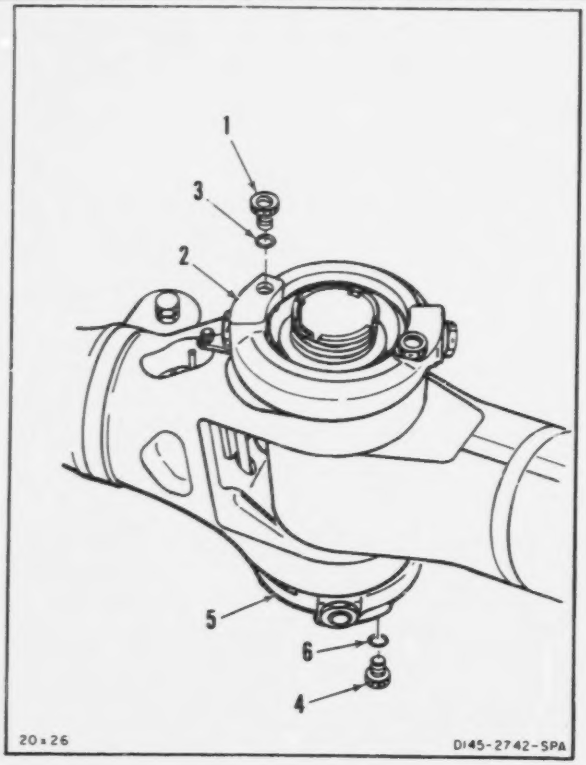
There are 12 vertical hinge pin oil tanks, two on each pitch housing. Procedure is similar to remove any oil tanks. Differences are noted in text.

1. Remove lockwire from one filler/drain plug (1) on upper tank (2). **Remove plug** and packing (3).

NOTE

One cup of oil must be drained when removing upper tank. All oil must be drained when removing lower tank.

2. Remove lockwire from one filler/drain plug (4) on lower tank (5). Remove plug and packing (6). **Drain oil.** Use container and cloth (E120) for spilled oil.



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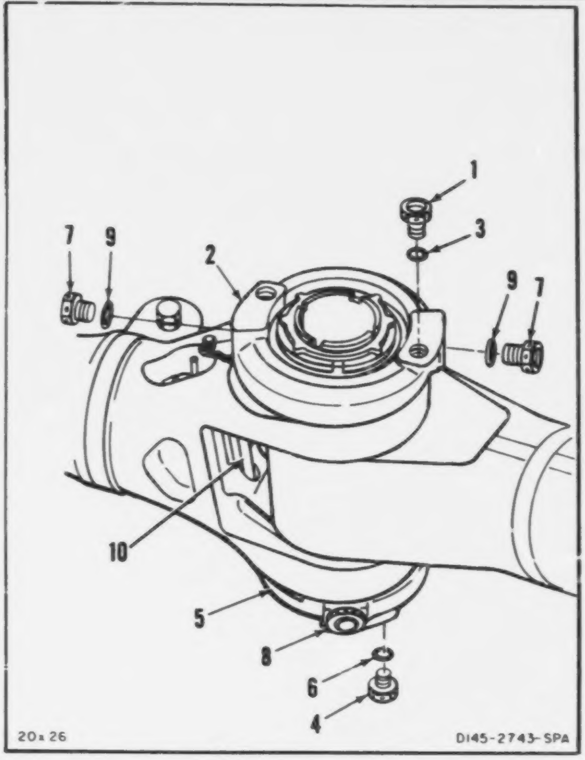
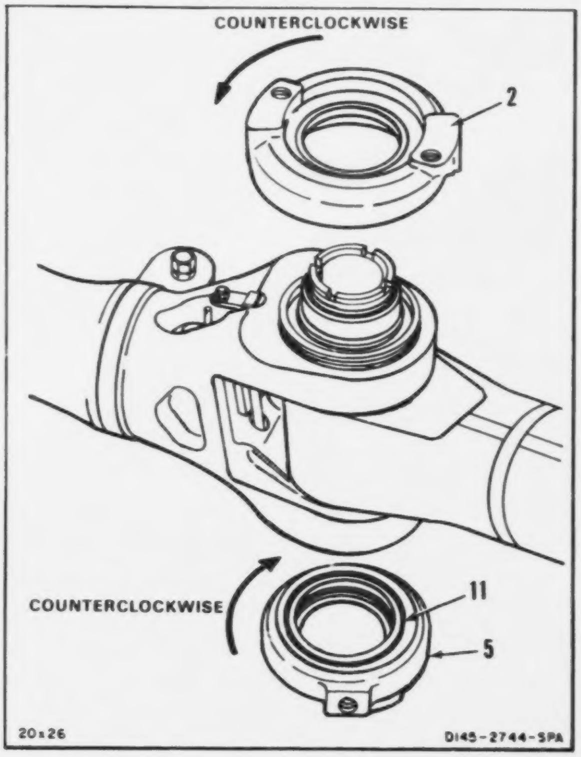
5-28 REMOVE VERTICAL HINGE PIN OIL TANKS (Continued) 5-28

3. **If tank (2 or 5) will be replaced,** do the following:
    a. Remove lockwire from remaining plug (1 or 4), and two sight indicators (7 or 8).
    b. Remove remaining plug (1 or 4), and packing (3 or 6).
    c. Remove two sight indicators (7 or 8) and two packings (9).
4. **If tank will be reinstalled,** install plugs (1 and 4) and two packings (3 and 6) in tank (2 or 5).
5. Remove lockwire between tank (2 or 5) and mainfold tube (10).


1
3
7
9
2
9
7
10
5
8
6
4
20x26
D145-2743-SPA

6. Turn tank (2 or 5) counterclockwise. Use wood block as lever between filler lugs of tank. **Remove tank** and packing (11).


COUNTERCLOCKWISE
2
11
COUNTERCLOCKWISE
5
20x26
D145-2744-SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-29 INSTALL VERTICAL HINGE PIN OIL TANK 5-29

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Guide (T33)
Torque Wrench, 30 to 150 Inch-Pounds

Materials:

Lockwire (E231)
Dry Cleaning Solvent (E162)
Emery Cloth (E123)
Grease (E190)
Cloth (E120)
Gloves (E186)

Parts:

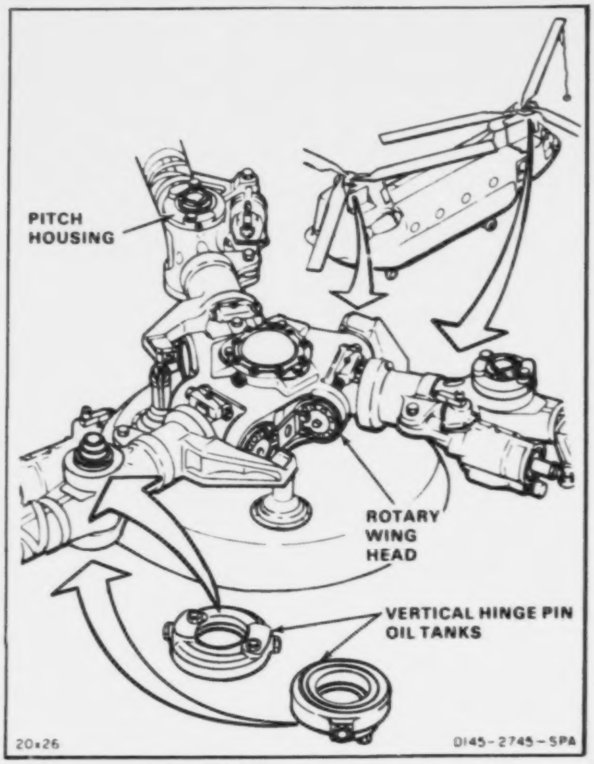
Packings

Personnel Required:

68D10 Aircraft Powertrain Repairer
68D20 Aircraft Powertrain Repairer
67U30 Inspector

References:

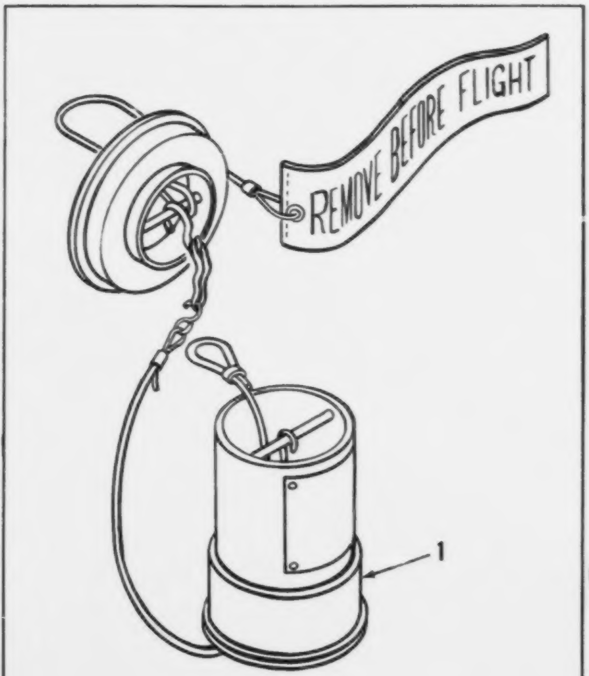
TM 55-1520-240-23P
Task 1-58


PITCH HOUSING
ROTARY WING HEAD
VERTICAL HINGE PIN OIL TANKS
20x26
D145-2745-SPA

NOTE

There are 12 vertical hinge pin oil tanks, two on each pitch housing. Procedure is similar to install any oil tank. Differences are noted in text.

1. Remove any burrs or sharp edges from guide (T33) (1). Use emery cloth (E123).


REMOVE BEFORE FLIGHT
1
20x26
D145-2746-SPA

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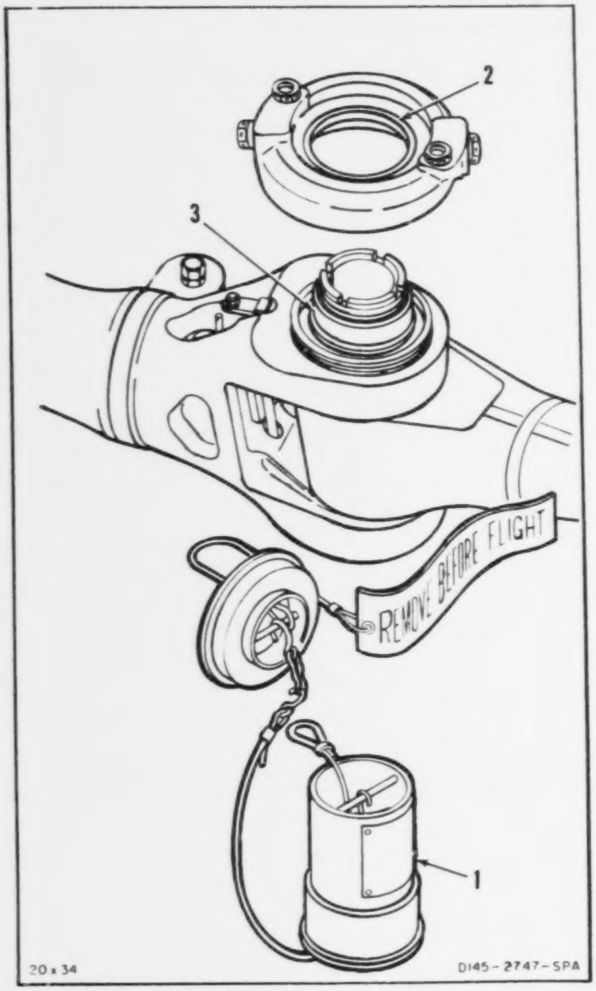
5-29 INSTALL VERTICAL HINGE PIN OIL TANK (Continued) 5-29

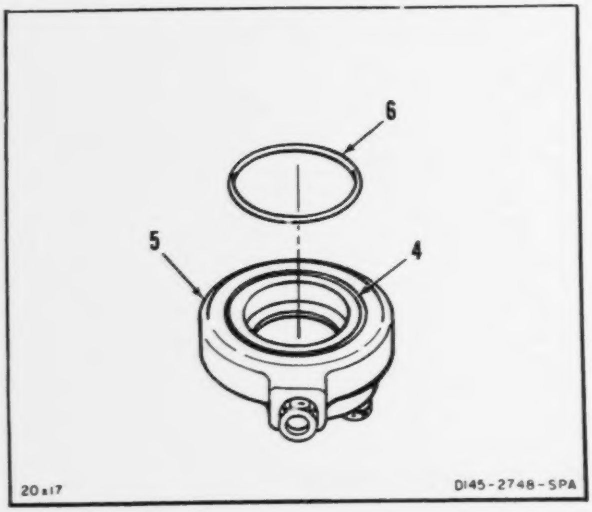
NOTE

Do not apply grease to vertical pin thread.

2. Apply grease (E190) to lips of seal (2), and to surfaces of inner bearing race (3) and guide (T33) (1) that will contact seal. Wear gloves (E186).


2
3
REMOVE BEFORE FLIGHT
1
20 x 34
DI45-2747-SPA

3. Apply grease (E190) to packing groove (4) on joint surface of tank (5). Use just enough grease to hold packing groove. Wear gloves (E186).
4. **Install packing (6)** in groove (4).


6
5
4
20 x 17
DI45-2748-SPA

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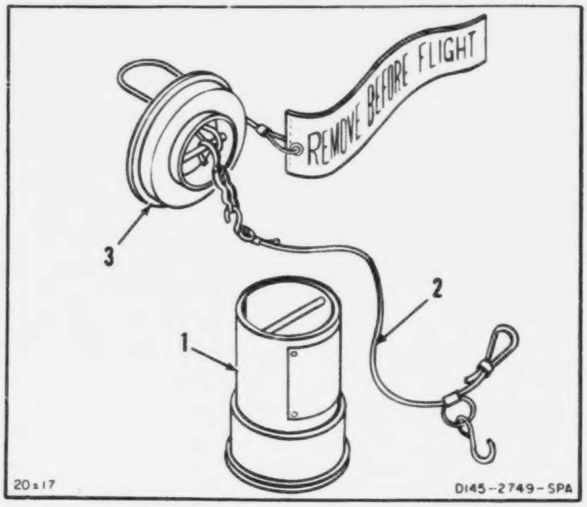
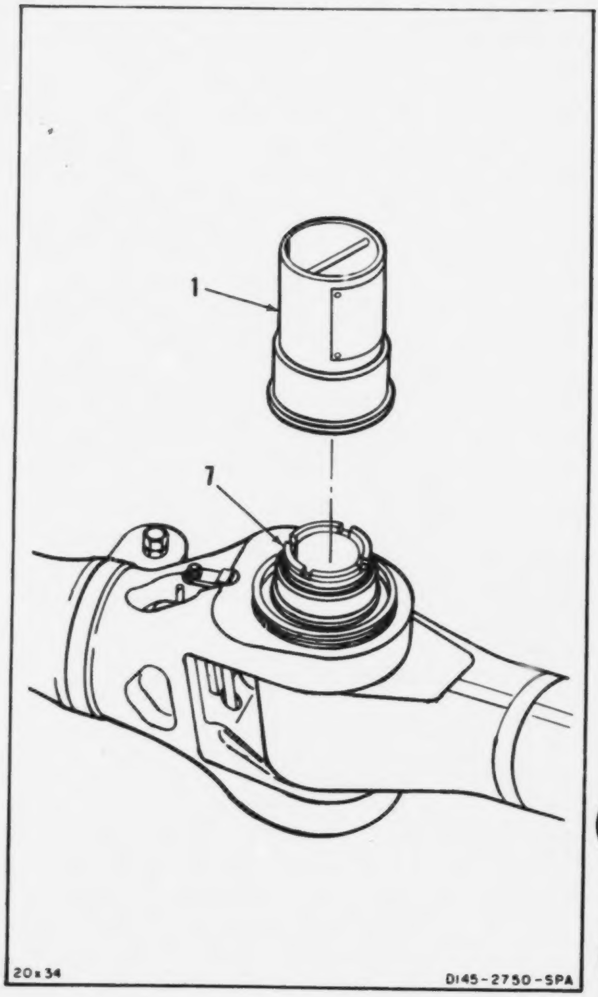
5-29 INSTALL VERTICAL HINGE PIN OIL TANK (Continued) 5-29

TO INSTALL UPPER TANK

5. Remove cable (2) and cap (3) from guide (1).


REMOVE BEFORE FLIGHT
3
2
1
20x17
D145-2749-SPA

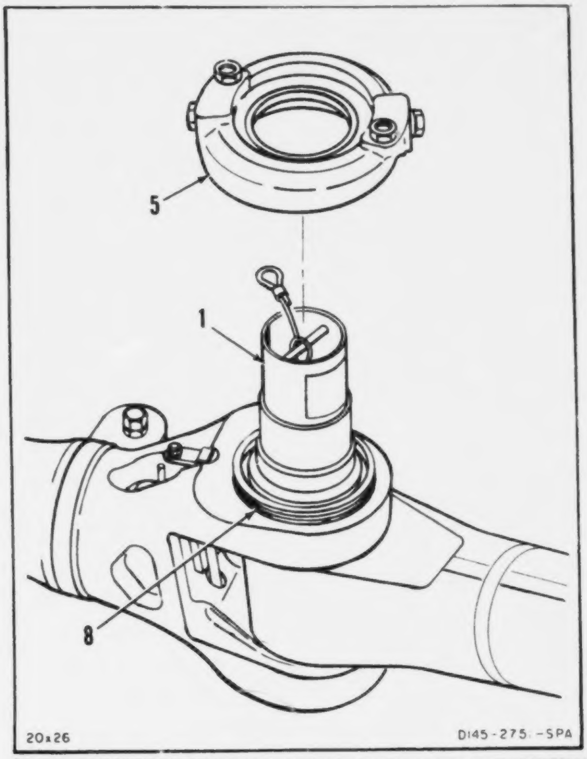
6. **Position guide (T33) (1)** over vertical pin (7).


1
7
20x34
D145-2750-SPA

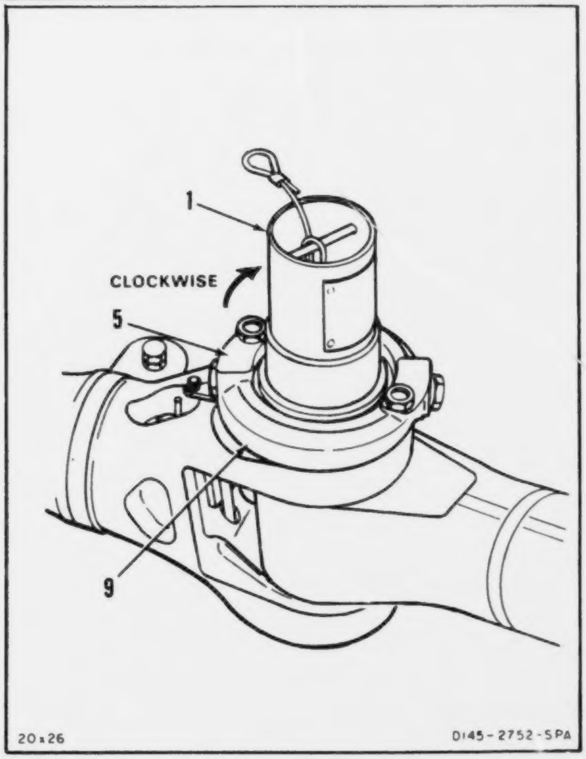
GO TO NEXT PAGE

5-29 INSTALL VERTICAL HINGE PIN OIL TANK (Continued) 5-29

7. **Install tank (5)** over guide (T33) (1) and engage thread of tank with thread of liner (8).


5
1
8
20x26
D145-275:-SPA

8. Turn tank (5) clockwise by hand until tank contacts lug (9).
9. Remove guide (T33) (1).

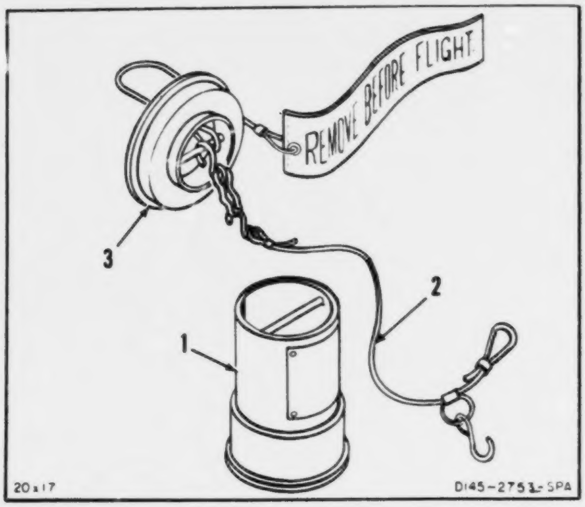

1
CLOCKWISE
5
9
20x26
D145-2752-SPA

GO TO NEXT PAGE

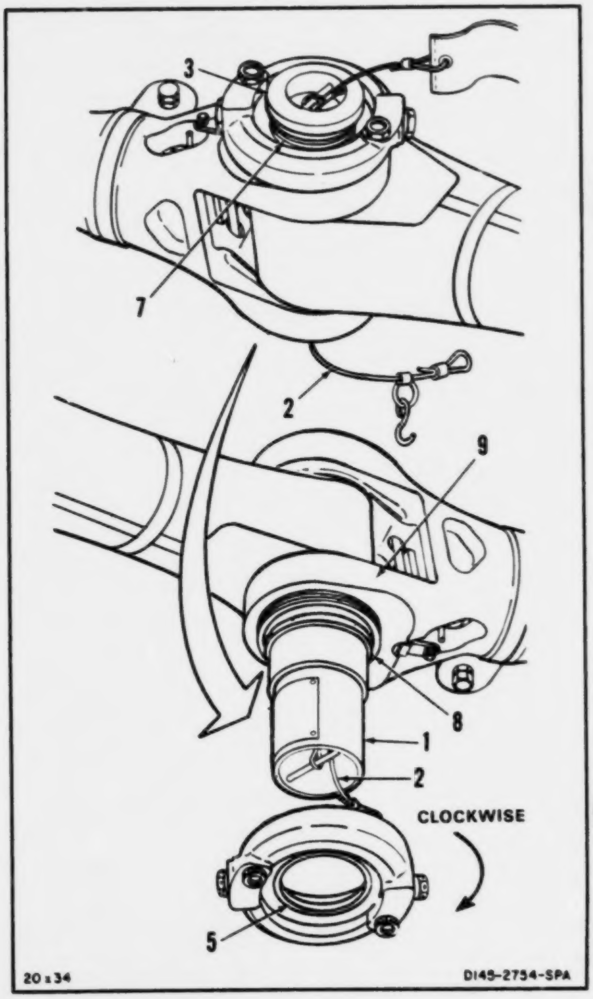
5-29 INSTALL VERTICAL HINGE PIN OIL TANK (Continued) 5-29

TO INSTALL LOWER TANK

10. Remove cable (2) and cap (3) from guide (1).


REMOVE BEFORE FLIGHT
3
2
1
20x17
D145-2753-SPA

11. **Position cap (3) over vertical pin (7).** Pass cable (2) through pin.
12. Hold guide (T33) (1) in place under lower lug (9). Grasp loop of cable (2) and pull. **Hook cable on guide.**
13. **Install tank (5)** over guide (T33) (1) and mate thread of tank with thread of liner (8).


3
7
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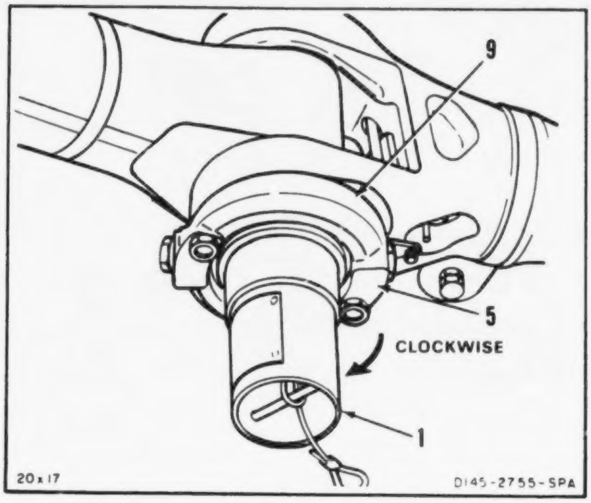
9
8
1
2
CLOCKWISE
5
20x34
D145-2754-SPA

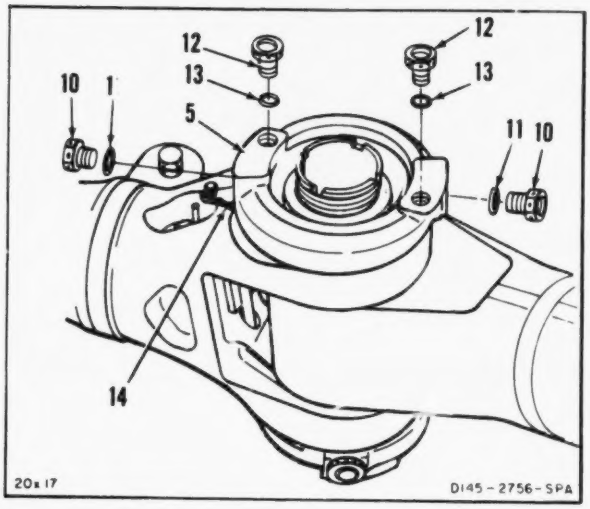
GO TO NEXT PAGE

5-29 INSTALL VERTICAL HINGE PIN OIL TANK (Continued) 5-29

14. Turn tank (5) clockwise by hand until tank contacts lug (9). Tighten tank handtight.
15. Remove guide (T33) (1).



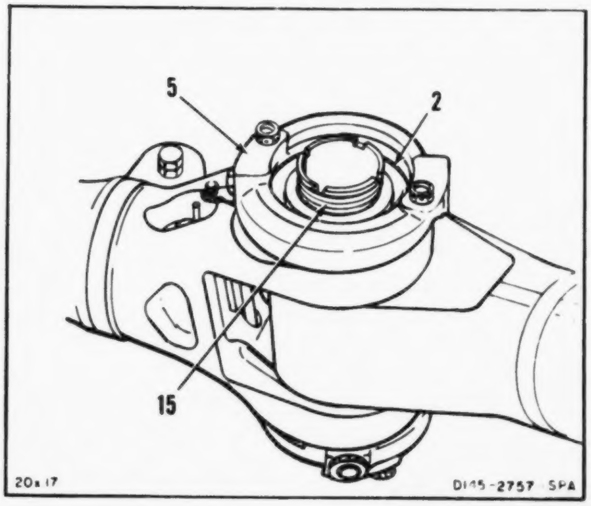
16. **If tank (5) is a replacement, install two sight indicators (10)** and packings (11). **Torque sight indicators to 125 inch-pounds.**
17. **Service oil tank (5)** (Task 1-58).
18. **Install filler/drain plugs (12)** and packings (13). **Torque plugs to 85 inch-pounds.**
19. Lockwire plugs (12) to sight indicators (10). Lockwire tank (5) to manifold (14). Use lockwire (E231).



WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

20. Wipe excess grease from tank (5), seal (2), and thread (15). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).



INSPECT

GO TO NEXT PAGE

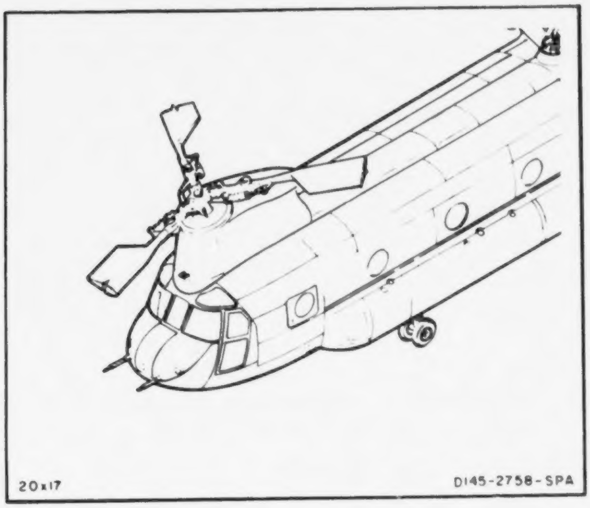
5-29 INSTALL VERTICAL HINGE PIN OIL TANK (Continued) 5-29

FOLLOW-ON MAINTENANCE:

Install vertical hinge pin nuts (Task 5-84).

Close work platform (Task 2-2).

Pressure test (Task 5-5).



END OF TASK

5-30 REMOVE VERTICAL HINGE PIN OIL MANIFOLD TUBE 5-30

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit,
NSN 5180-00-003-5267
Rawhide Mallet

Materials:

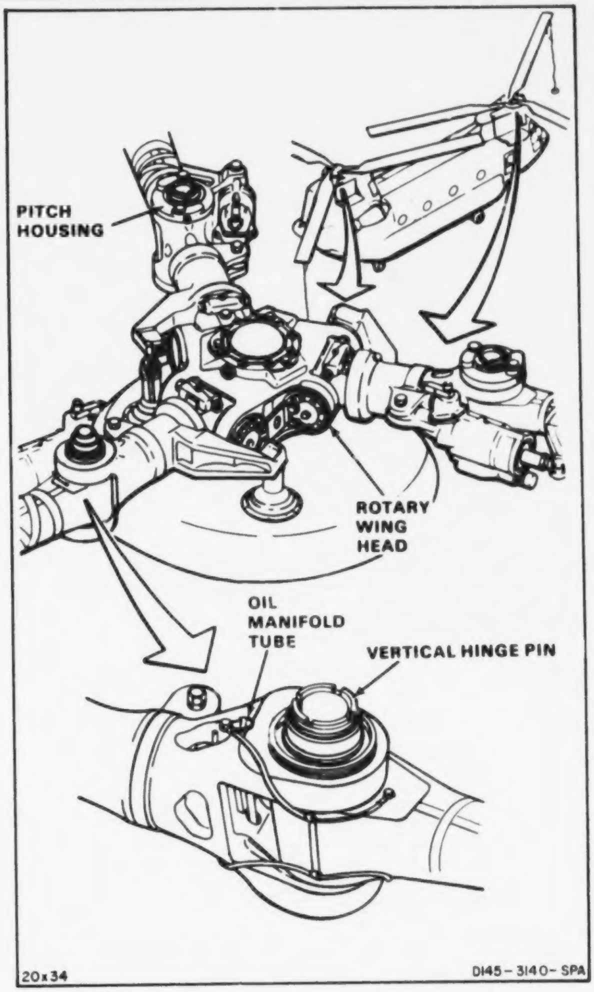
None

Personnel Required:

Aircraft Powertrain Repairer (2)

Equipment Condition:

Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied Down (Task 1-26)
Work Platform Open (Task 2-2)
Upper Vertical Hinge Pin Oil Tank Removed (Task 5-28)


PITCH HOUSING
ROTARY WING HEAD
OIL MANIFOLD TUBE
VERTICAL HINGE PIN
20x34
D145-3140-SPA

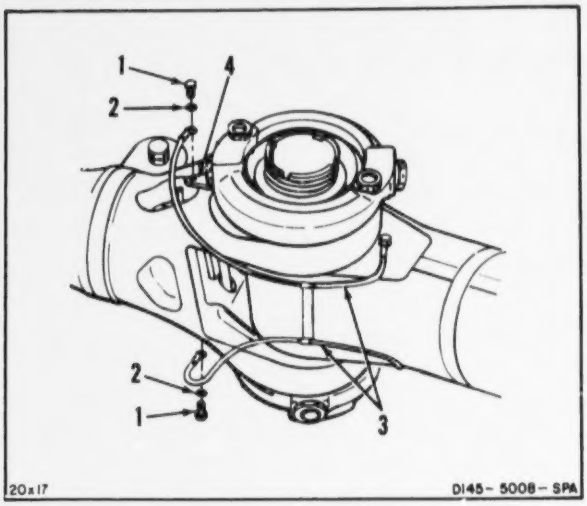
GO TO NEXT PAGE

5-30 REMOVE VERTICAL HINGE PIN OIL MANIFOLD TUBE (Continued) 5-30

NOTE

Procedure is same to remove any vertical hinge pin oil manifold tube.

1. **Remove two** bolts (1), washers (2), and **lightning protection cables (3)** from oil manifold tube (4).

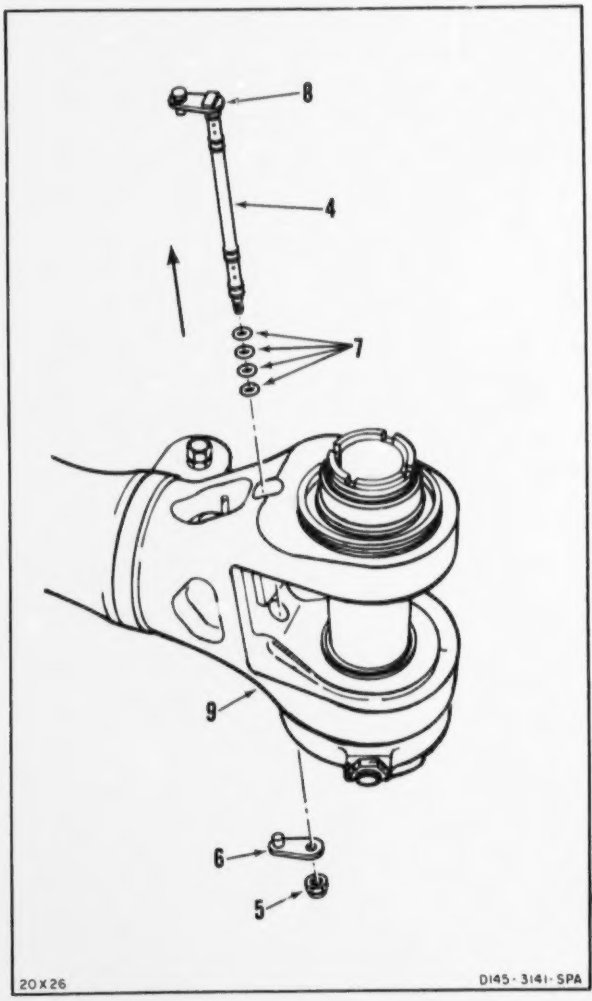


2. Remove lockwire from lower end of oil manifold tube (4). **Remove nut (5) and bracket (6).**

CAUTION

Do not damage bore of pitch housing when removing oil manifold tube. This can cause damage to packings during tube installation.

3. **Remove tube (4)** and four packings (7) as follows:
   a. Push tube (4) straight up until bracket (8) is clear of housing (9). Use rawhide mallet if needed.
   b. Pull bracket (8) and tube (4) straight up out of housing (9).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-31 INSTALL VERTICAL HINGE PIN OIL MANIFOLD TUBE 5-31

INITIAL SETUP

Applicable Configurations:
All

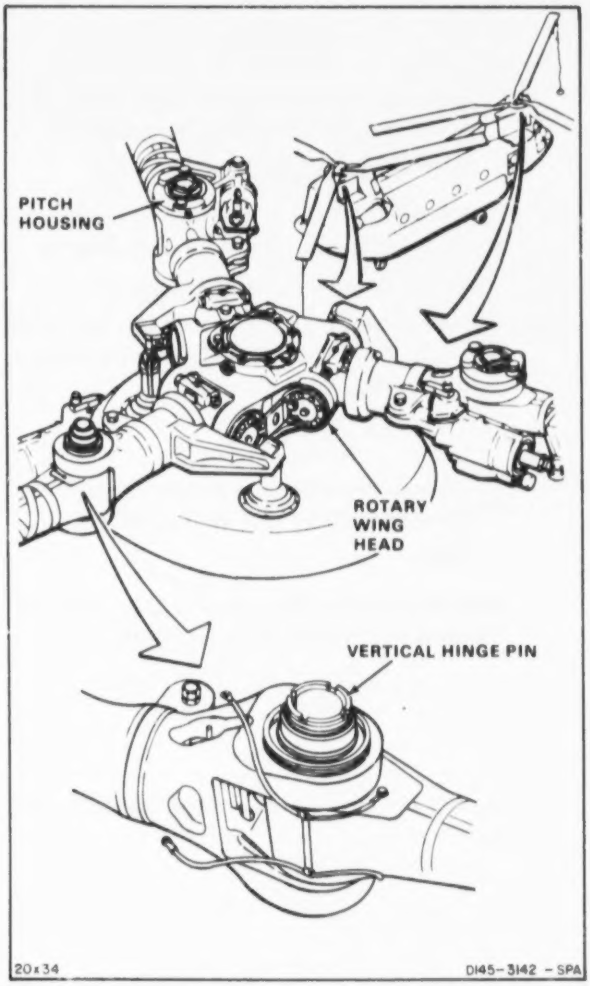
Tools:
Powertrain Repairer's Tool Kit,
NSN 5180-00-003-5267
Torque Wrench, 0 to 150 Inch-Pounds
Rawhide Mallet

Materials:
Lockwire (E231)
Oil (E254)

Parts:
Packings

Personnel Required:
Aircraft Powertrain Repairer (2)
Inspector

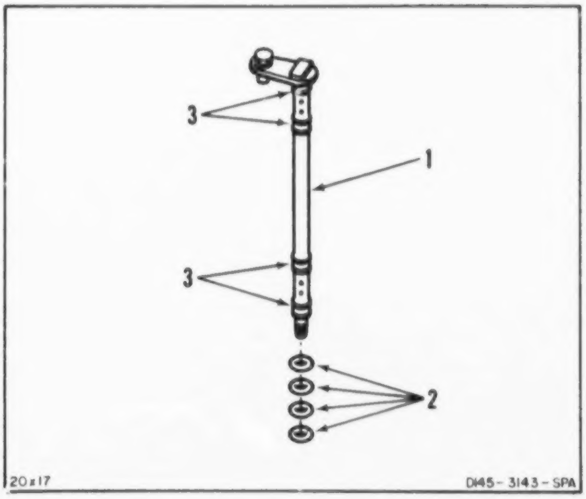
References:
TM 55-1520-240-23P
Task 5-29
Task 1-58


PITCH HOUSING
ROTARY WING HEAD
VERTICAL HINGE PIN
20x34
DI45-3142 - SPA

NOTE

Procedure is same to install any vertical hinge pin oil manifold tube.

1. Lubricate oil manifold tube (1) and four packings (2). Use oil (E254). Position packings in grooves (3) on tube.


3
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20x17
DI45-3143-SPA

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5-31 INSTALL VERTICAL HINGE PIN OIL MANIFOLD TUBE (Continued) 5-31

CAUTION

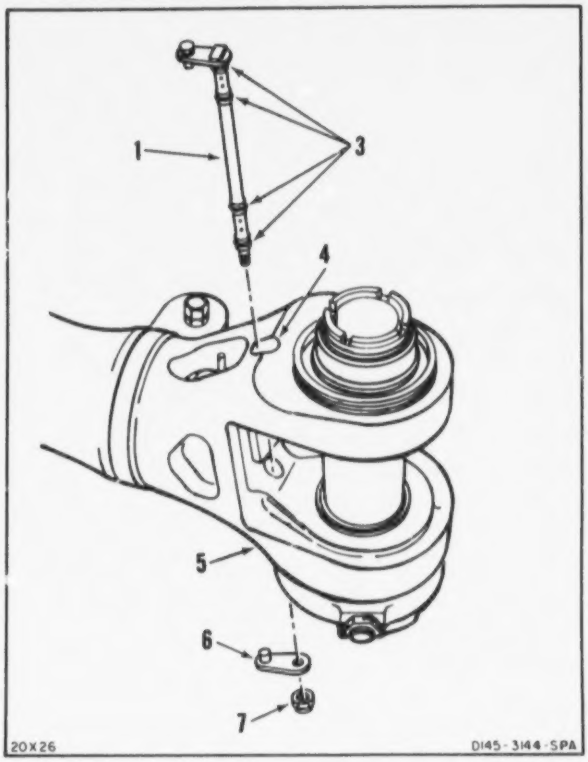
Do not install tube in tube bore if bore is burred or dry. Damage to packings can occur.

2. Check that tube bore (4) in pitch varying housing (5) is clean and free of any burrs.
3. Lubricate bore (4). Use oil (E254).
4. **Install tube (1)** through bore (4). Be careful not to pinch or cut packings (3). Tap lightly with rawhide mallet if needed.

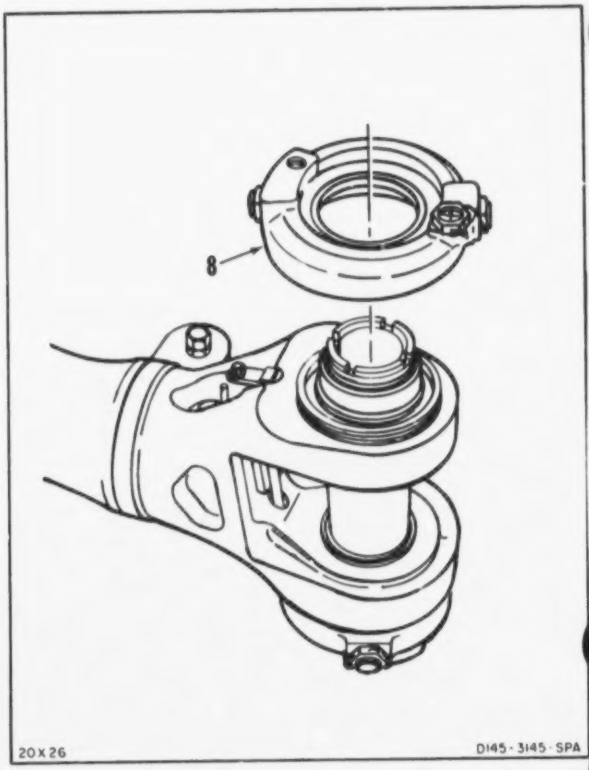
CAUTION

Do not overtorque retaining nut. Overtorque of nut will damage tube.

5. **Install bracket (6)** and nut (7) on tube (1). **Torque nut to 15 inch-pounds.**



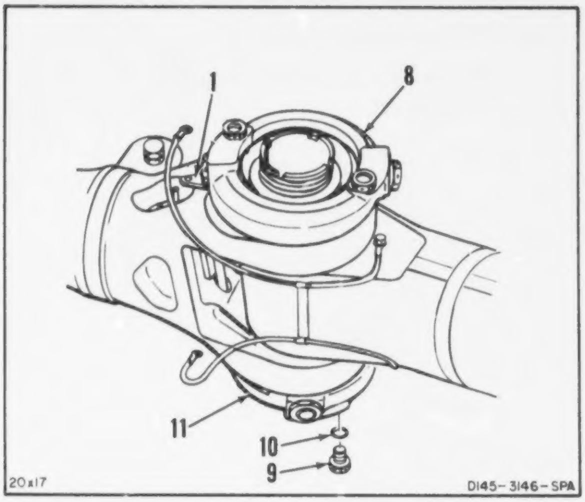
6. **Install upper vertical hinge pin oil tank (8)** (Task 5-29).



GO TO NEXT PAGE

5-31 INSTALL VERTICAL HINGE PIN OIL MANIFOLD TUBE (Continued) 5-31

7. **Install drain plug (9)** and packing (10) in lower oil tank (11). **Torque plug to 85 inch-pounds.**
8. Lockwire oil manifold tube (1) to upper and lower oil tanks (8 and 11). Use lockwire (E231).
9. **Service vertical hinge pin oil tanks (8 and 11)** (Task 1-58). Use oil (E254).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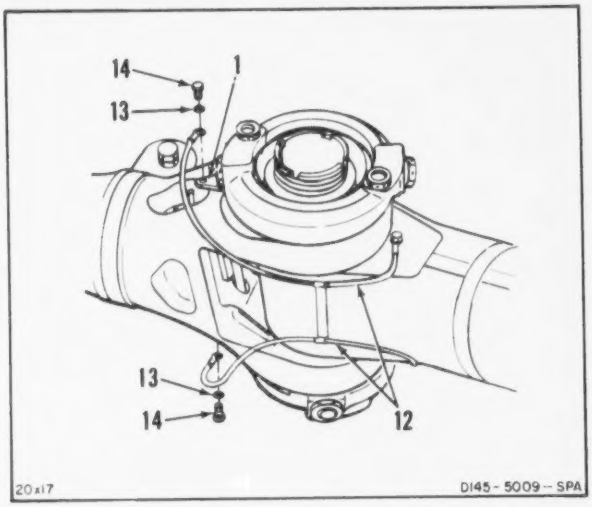
20x17
D145-3146-SPA

10. **Install two lightning protection cables (12),** washers (13), and bolts (14) on manifold tubes (1). **Torque bolts to 35 inch-pounds.**


14
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14
12
20x17
D145-5009--SPA

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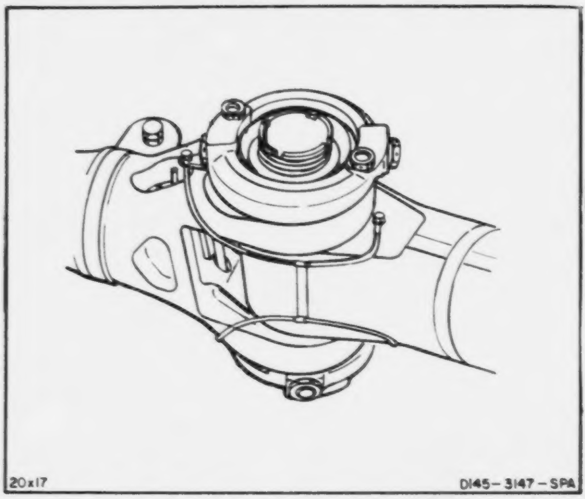
5-31 INSTALL VERTICAL HINGE PIN OIL MANIFOLD TUBE (Continued) 5-31

FOLLOW-ON MAINTENANCE:

Pressure test vertical hinge pin oil tanks (Task 5-5).



END OF TASK

5-32 REMOVE VERTICAL HINGE PIN OUTER SEAL 5-32

INITIAL SETUP

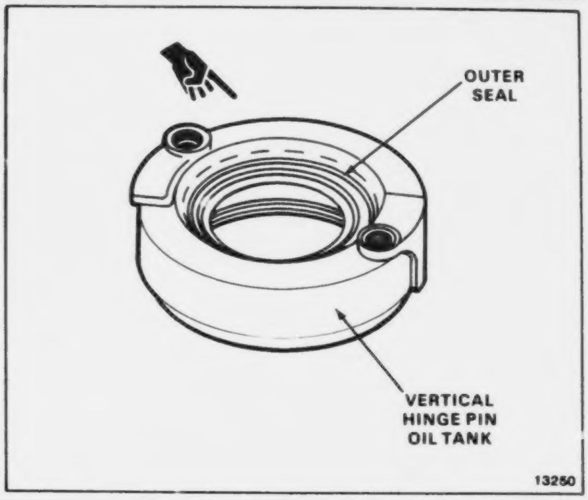
Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Drift, Soft Aluminum, 1/2-Inch Diameter

Materials:
None

Personnel Required:
Aircraft Powertrain Repairer (2)

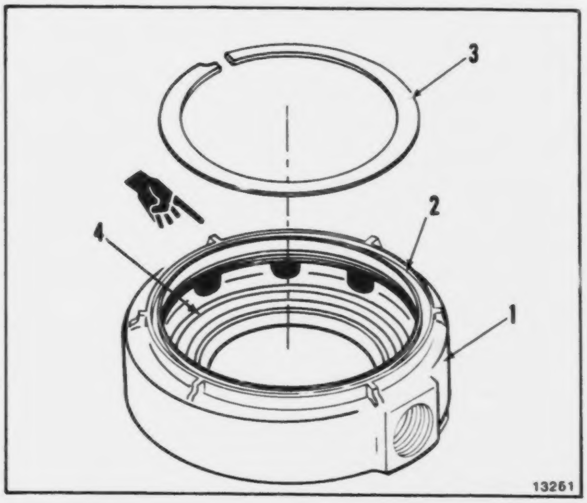
Equipment Condition:
Off Helicopter Task
Vertical Hinge Pin Oil Tank Removed (Task 5-28)



NOTE

Procedure is same to remove outer seal from all 12 vertical hinge pin oil tanks.

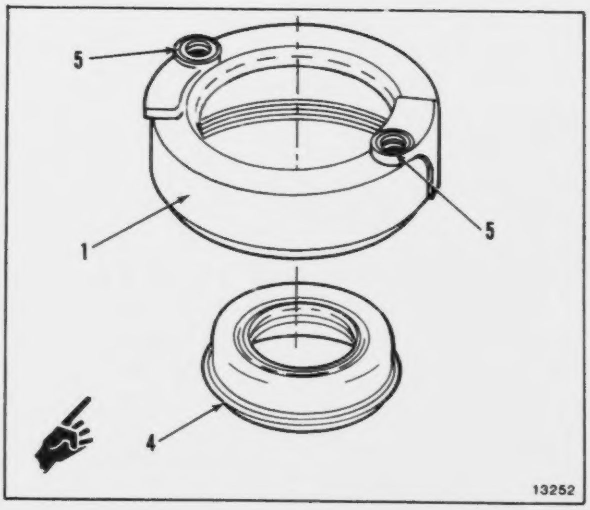
1. Position tank (1), packing groove (2) up, on flat work surface.
2. **Remove retaining ring (3)** from seal (4). Use small screwdriver.



3. Position tank (1) with filler ports (5) up.
4. **Tap seal (4) out of tank (1).** Use hammer and soft aluminum drift.

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-33 REMOVE VERTICAL HINGE PIN INNER SEAL 5-33

INITIAL SETUP

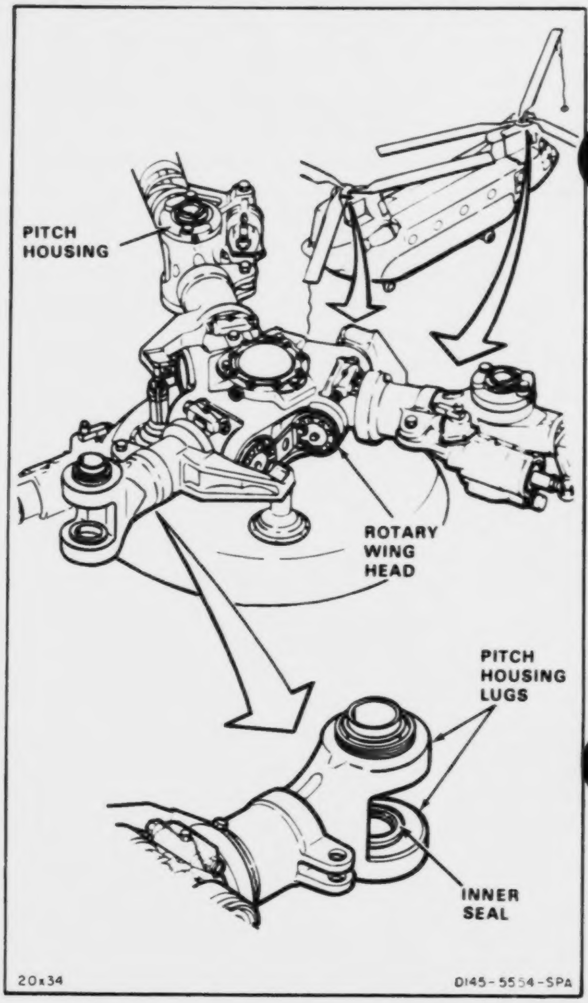
Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Drift, Soft Aluminum, 1/2-Inch X 12 Inches

Materials:
Gloves (E186)

Personnel Required:
68D10 Aircraft Powertrain Repairer
68D20 Aircraft Powertrain Repairer

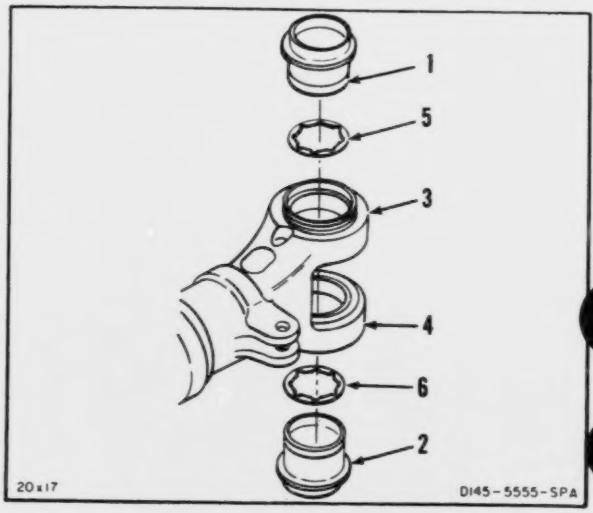
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied-Down (Task 1-26)
Vertical Hinge Pin and Rotary-Wing Blade Removal as required (Task 5-64)
Vertical Hinge Pin Oil Tank Removed (Task 5-28)
Pylon Work Platform Open (Task 2-2)


PITCH HOUSING
ROTARY WING HEAD
PITCH HOUSING LUGS
INNER SEAL
20x34
D145-5554-SPA

NOTE

Procedure is same to remove vertical hinge pin inner seal from any pitch housing lug.

1. **Push inner bearing race (1 or 2) out of lug (3 or 4).** Use gloves (E186). Remove thrust washer (5 or 6).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20x17
D145-5555-SPA

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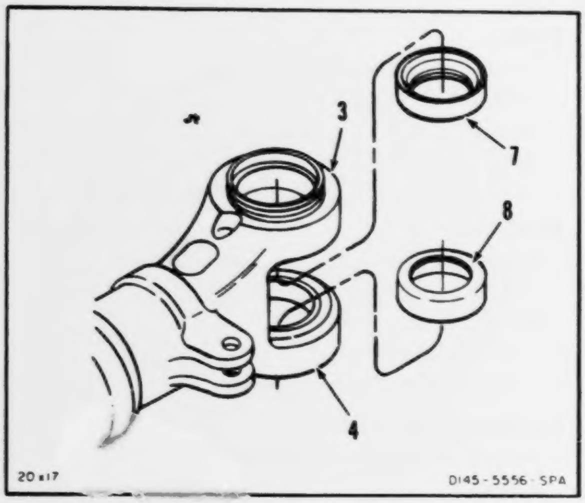
5-33 REMOVE VERTICAL HINGE PIN INNER SEAL (Continued) 5-33



CAUTION

Do not use screwdriver or other sharp tool to remove seal. Sharp tools can scratch lugs and cause lug failure. Seal seating surfaces and bearings can also be damaged.

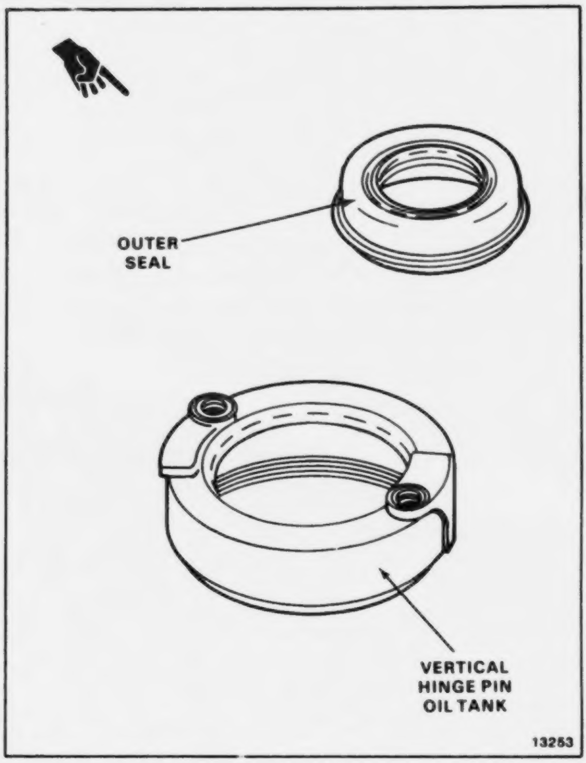
2. **Tap inner seal (7 or 8) from lug (3 or 4).** Use soft aluminum drift.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-34 INSTALL VERTICAL HINGE PIN OUTER SEAL 5-34



INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit,
NSN 5180-00-003-5267
Aircraft Inspector's Tool Kit,
NSN 5180-00-323-5114
Wood Block, 5-Inch Diameter x 4 Inches

Materials:

Cloths (E120)
Dry Cleaning Solvent (E162)
Gloves (E186)
Adhesive (E63.1)
Methyl-Ethyl-Ketone (E244)

Personnel Required:

Aircraft Powertrain Repairer (2)
Inspector

References:

TM 55-1520-240-23P

General Safety Instructions:

WARNING

Methyl-ethyl-ketone (E244) and dry cleaning solvent (E162) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes. Use gloves (E186).

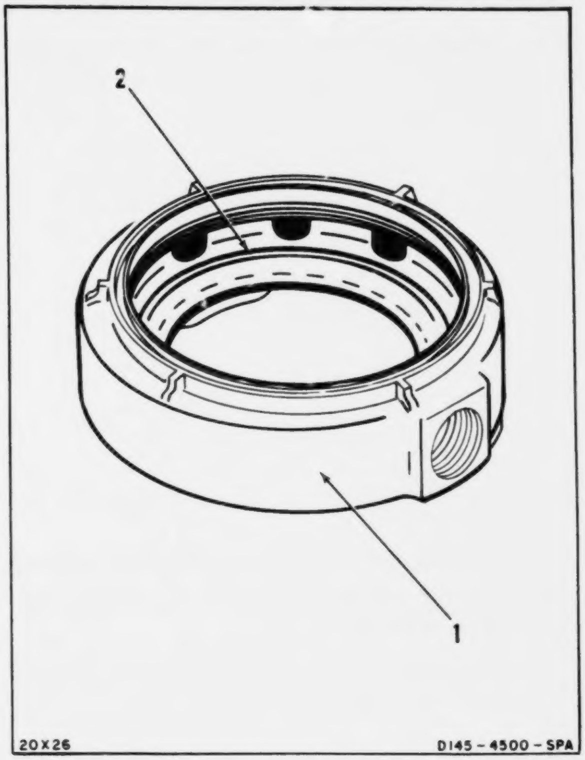
GO TO NEXT PAGE

5-34 INSTALL VERTICAL HINGE PIN OUTER SEAL (Continued) 5-34

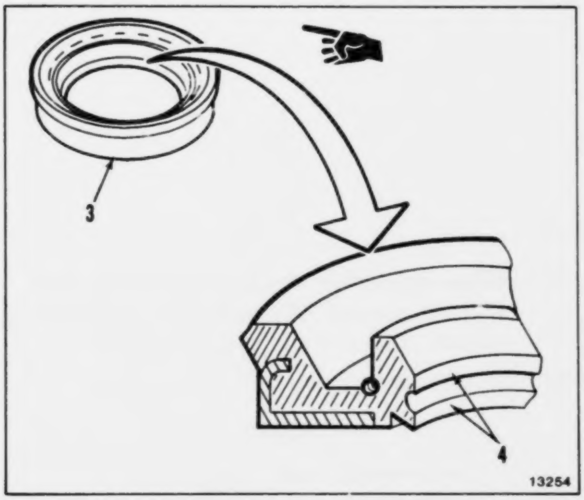
NOTE

Procedure is same to install outer seal in all 12 vertical hinge pin oil tanks.

1. Clean tank (1). Use cloth (E120) damp with dry cleaning solvent (E162). Wear gloves (E186).
2. Clean sealant from seal recess (2) in tank (1). Use methyl-ethyl-ketone (E244). Wear gloves (E186).
3. **Check tank (1) for cracks.** There shall be no cracks.



4. Remove protective coating from seal (3). Use cloth (E120) damp with dry cleaning solvent (E162). Wear gloves (E186).
5. **Check seal lips (4) for nicks or scratches.** Use magnifier. There shall be no nicks or scratches.



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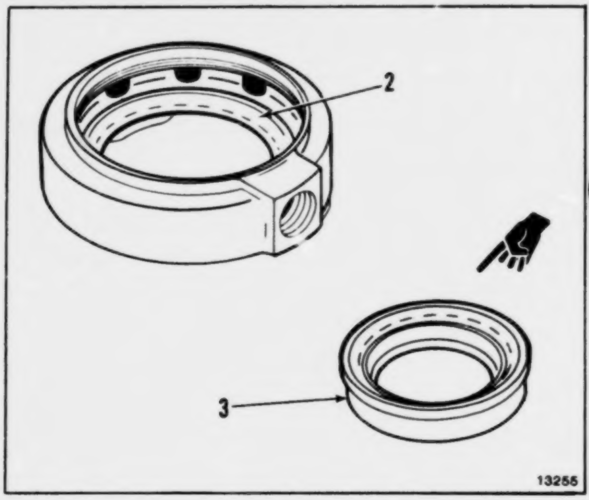
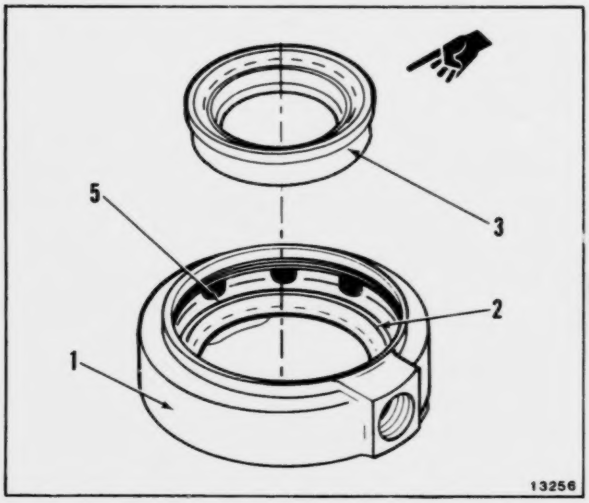
5-34 INSTALL VERTICAL HINGE PIN OUTER SEAL (Continued) 5-34

6. Apply light bead of adhesive (E63.1) to wall of seal recess (2) and outside wall of seal (3). Wear gloves (E186).



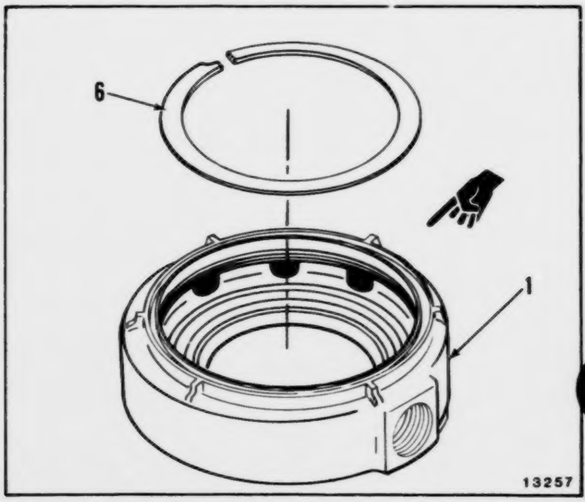
7. Position tank (1) with packing groove (5) up.
8. Position seal (3) open side up, over recess (2) in tank (1).
9. **Tap seal (3) into recess (2).** Use hammer and wood block.



10. **Wipe adhesive squeezeout from tank (1).** Use cloth (E120) damp with dry cleaning solvent (E162). Wear gloves (E186).
11. Install retaining ring (6).

NOTE

Let adhesive cure 1 hour before installing tank.



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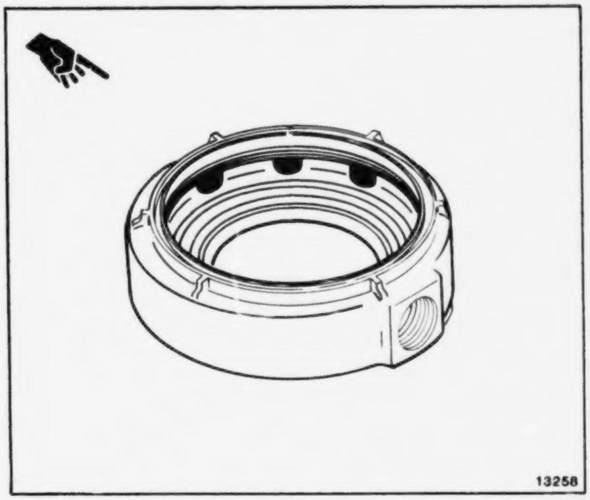
5-34 INSTALL VERTICAL HINGE PIN OUTER SEAL (Continued) 5-34

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-35 INSTALL VERTICAL HINGE PIN INNER SEAL 5-35

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Seal Puller (T10)
Guide Plug Set (T12)

Materials:

Dry Cleaning Solvent (E162)
Adhesive (E63.1)
Cloth (E120)
Grease (E190)
Oil (E254)
Gloves (E186)

Personnel Required:

Aircraft Powertrain Repairer (2)
Inspector

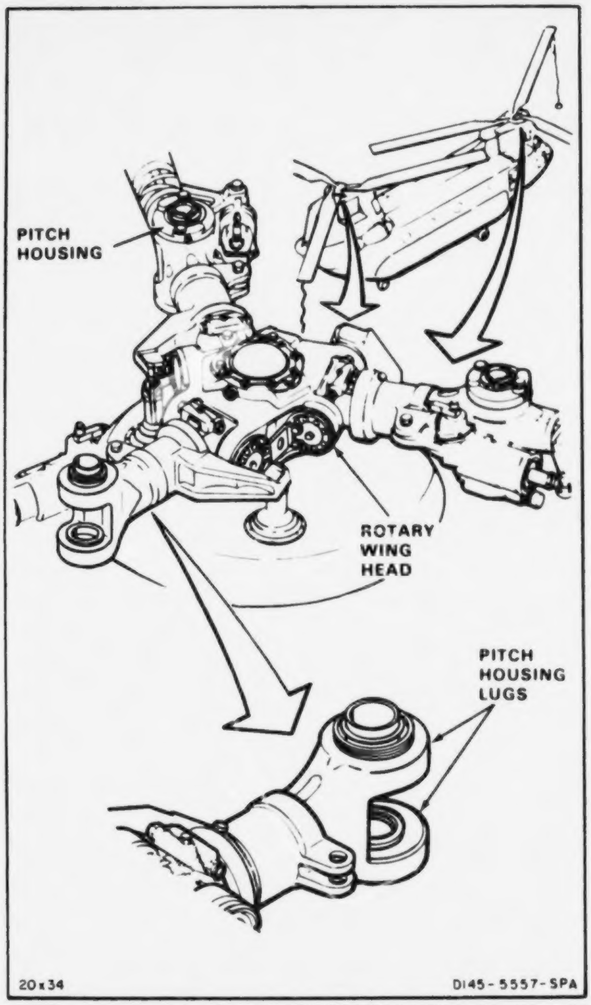
References:

TM 55-1520-240-23P

General Safety Instructions:

WARNING

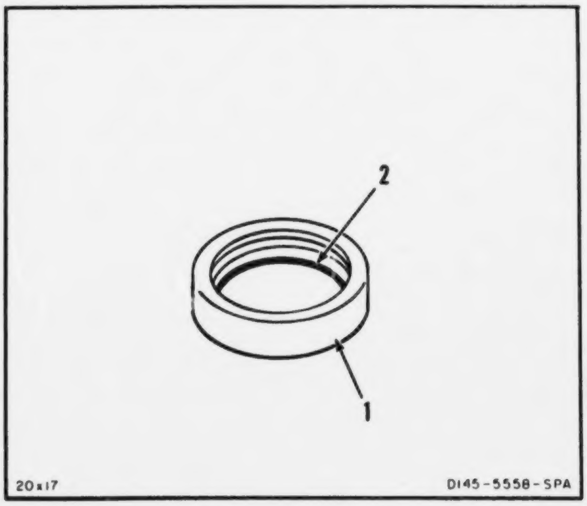
Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only on well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes. Use gloves (E186).



NOTE

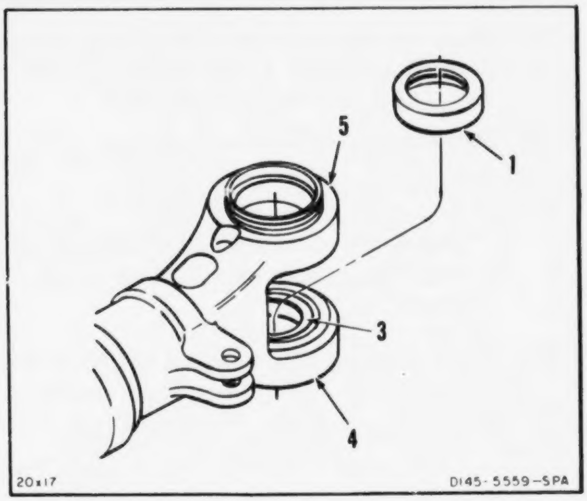
Procedure is similar to install vertical hinge pin inner seal in any pitch housing lug.

1. Remove preservative from seal (1). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
2. **Check seal lips (2)** for nicks or scratches. Use magnifier. There shall be no nicks or scratches.



GO TO NEXT PAGE

3. Apply adhesive (E63.1) to seal recess (3) and outer wall of seal (1). Wear gloves (E186).
4. **Position seal (1)** on lug (4 or 5), open side toward recess (3).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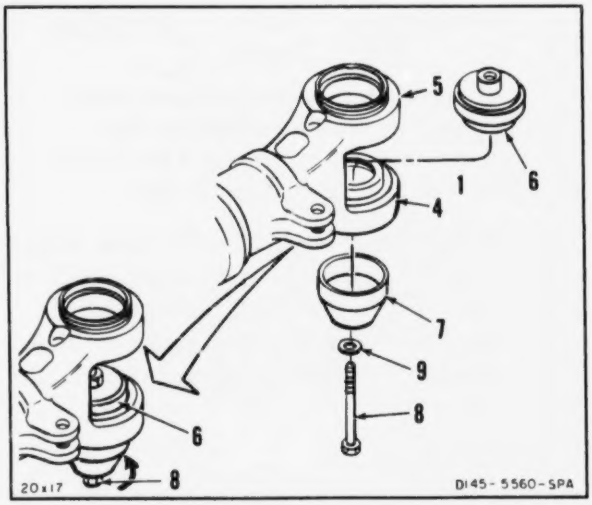
20x17
D145-5559-SPA

5. Position base of seal puller (T10) (6) on seal (1). Position driver (7) on lug (4 or 5). Install bolt (8) and washer (9) through driver and base.

CAUTION

Do not press seal past lug surface. Too much pressure can damage seal and cause leaks.

6. **Turn bolt (8) clockwise until base of seal puller (T10) (6) pulls seal (1) flush with lug (4 or 5).**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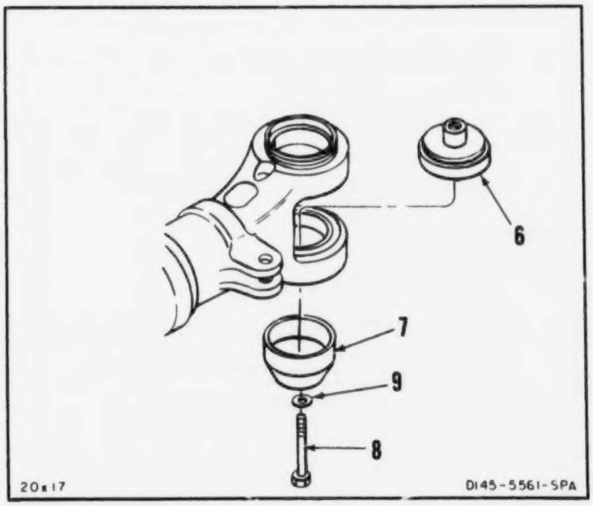
20x17
D145-5560-SPA

7. Turn bolt (8) counterclockwise. Remove bolt, washer (9), driver (7), and base of seal puller (T10) (6).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8
20x17
D145-5561-SPA

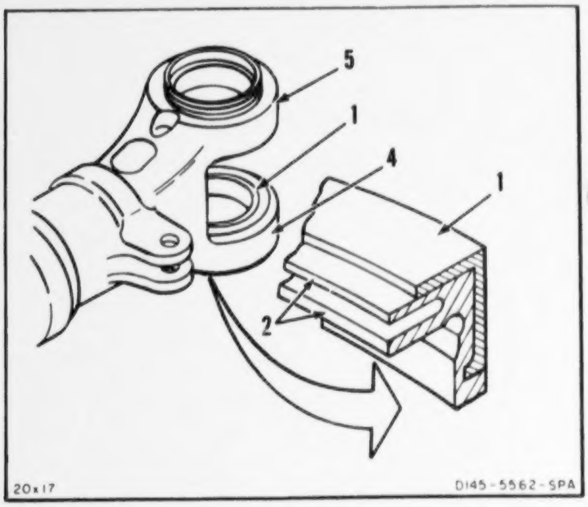
GO TO NEXT PAGE

8. **Wipe squeezeout from seal (1) and lug (4 or 5).** Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
9. Cure adhesive on seal for 1 hour.

CAUTION

Wipe off excess grease. Grease can foul passages and restrict oil flow.

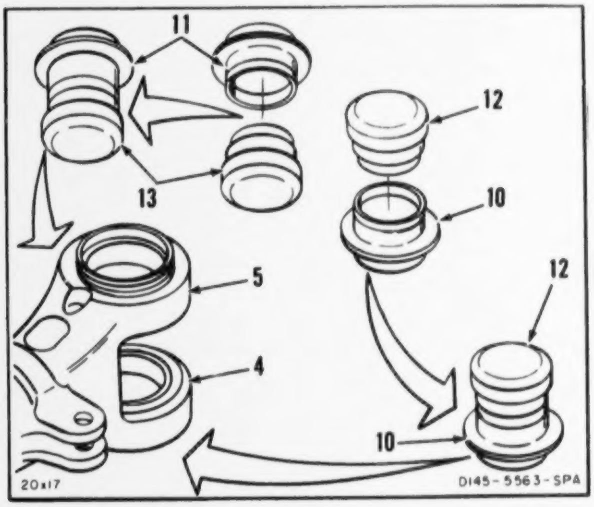
10. Apply grease (E190) between lips (2) of seal (1). Remove excess grease. Wear gloves (E186).



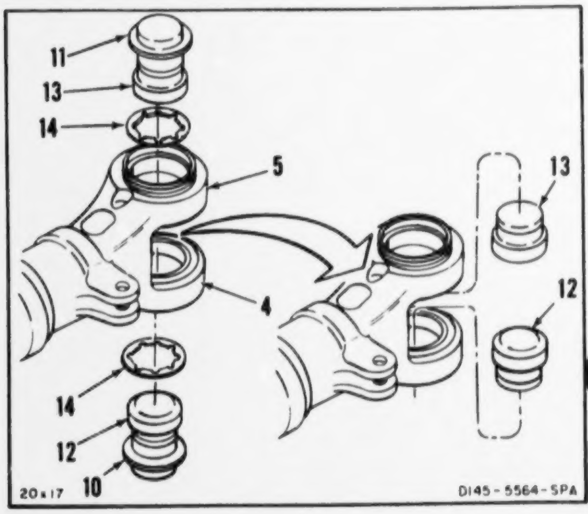
NOTE

Lower inner bearing race and guide plug are smaller in diameter than upper race and guide plug. Lower race is also longer than upper race.

11. **Select inner race (10 or 11) and guide plug (T12) (12 or 13)** for upper lug (5) or lower lug (4). Insert plug in inner race.
12. Apply film of oil (E254) to outside of inner race (10 or 11) and guide plug (T12) (12 or 13).



13. **Position thrust washer (14)** on inner race (10).
14. **Push plug (T12) (12) and inner race (10) into lug (4 or 5)** until race is seated. Use gloves (E186). Remove plug (T12).



INSPECT

FOLLOW-ON MAINTENANCE:

Install vertical hinge pin tank (Task 5-29).
Install rotary-wing blade (Task 5-84).
Close work platform (Task 2-2).

END OF TASK

5-36 REMOVE VERTICAL HINGE PIN BEARING 5-36

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Bearing Puller (T102)
Drift, Soft Aluminum, 1/2 X 1/2 X 12 Inches
Heater Gun
Kevlar Gloves (E187)

Materials:

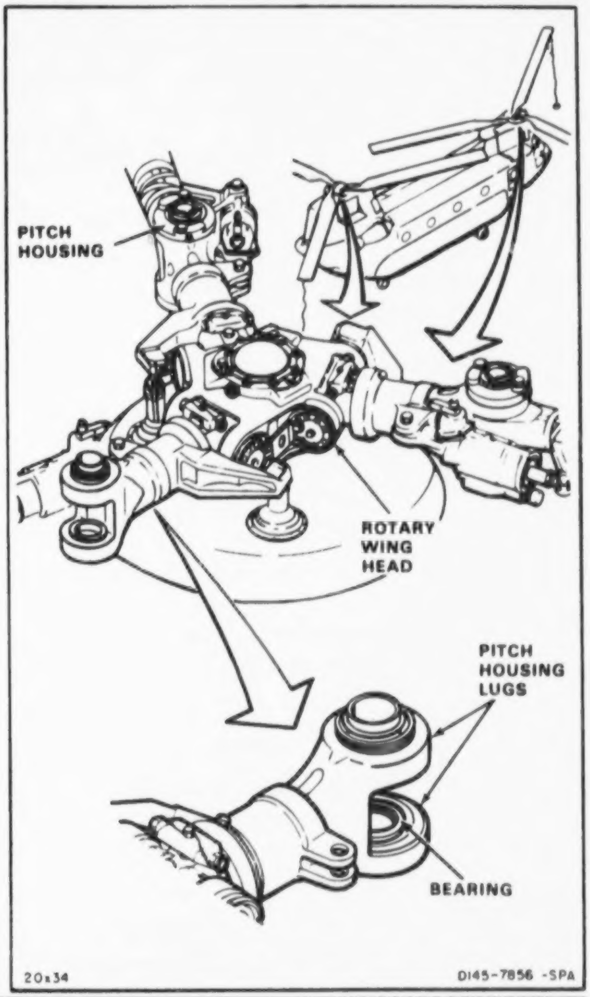
Temperature Indicating Strips (E413)
Pencil, Marking (E271)
Paper Tag (E264)

Personnel Required:

Aircraft Powertrain Repairer (2)

Equipment Condition:

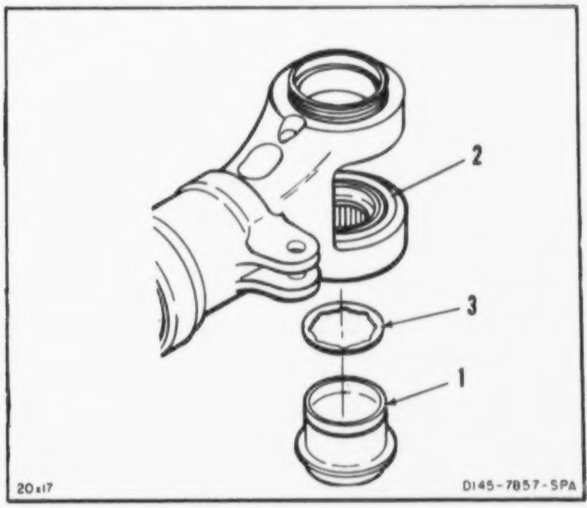
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied Down (Task 1-26)
Pylon or Forward Work Platform Open (Task 2-2)
Rotary-Wing Blade Removed As Required (Task 5-64)
Vertical Hinge Pin Oil Tank Removed As Required (Task 5-28)



NOTE

Procedure is same to remove vertical hinge pin bearing from any pitch housing lug. Lower lug is shown in task.

1. Matchmark inner bearing race (1) to lug liner (2). Use marking pencil (E271).
2. **Push inner bearing race (1) out of lug liner (2).** Use gloves (E186). Remove thrust washer (3).
3. Tag race (1) with rotary-wing head, color of pitch housing, and lug from which race was removed.



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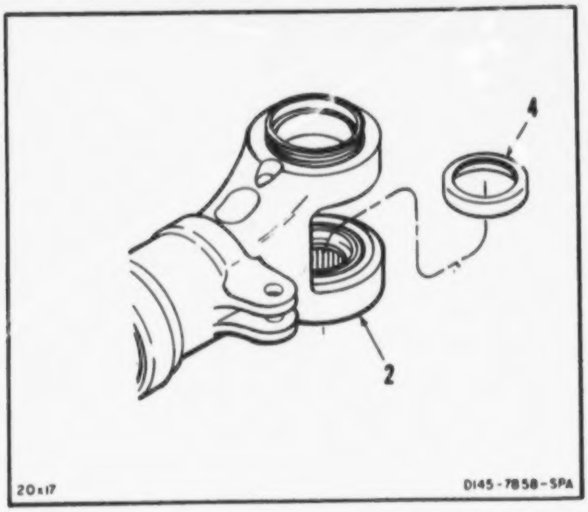
CAUTION

Do not use screwdriver or other sharp tool to remove seal. Sharp tools can scratch lugs and cause lug failure. Seal seating surfaces and bearings can also be damaged.

4. **Tap inner seal (4) from lug (2).** Use soft aluminum drift

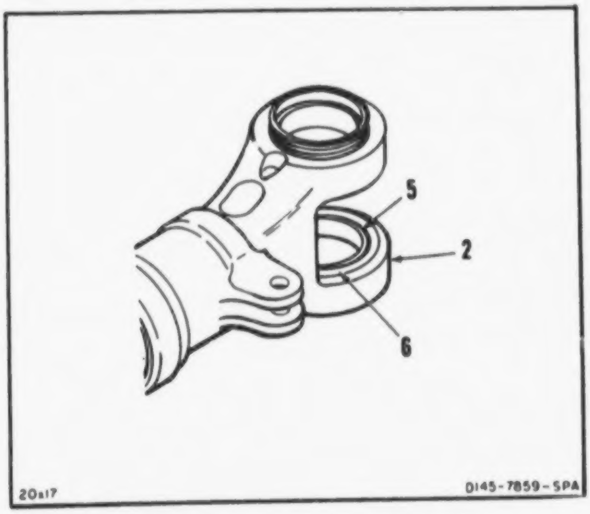


5. **Matchmark outer race (5) to lug liner (6).** Use marking pencil (E271).

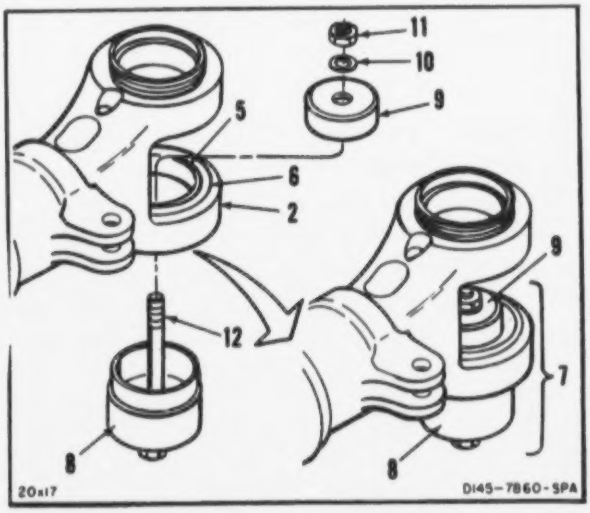
CAUTION

Do not exceed 250° F (121° C) when heating lug. Lug will be damaged.

6. **Heat lug (2) to 240° F (116° C). Use heater gun. Use temperature indicating strips (E413) to monitor temperature. Wear gloves (E187).**



7. **Install bearing puller (T102) (7)** as follows:
   a. Position cap (8) on lug liner (6) outside of lug (2).
   b. Position base (9) against bearing outer race (5) inside of lug (2).
   c. Install washer (10) and nut (11) on bolt (12).



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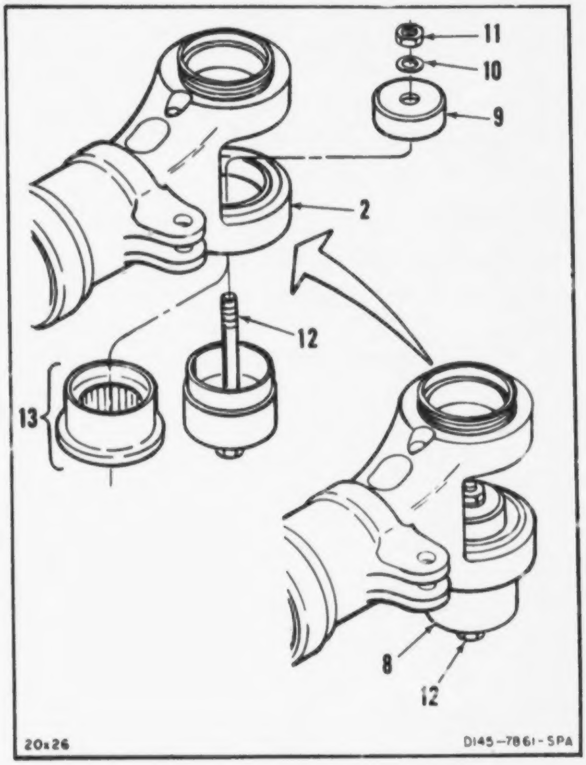
5-36 REMOVE VERTICAL HINGE PIN BEARING (Continued) 5-36

8. Tighten bolt (12) until bearing (13) is drawn out of lug (2).
9. **Remove** nut (11), washer (10), base (8), bolt (12), cap (9), and **bearing (13).**
10. Tag bearing (13) with rotary-wing head, color of pitch housing, and lug from which bearing was removed.

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-37 INSPECT VERTICAL HINGE PIN AND BEARINGS 5-37

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Drift, Aluminum 0.0625 x 6 Inches

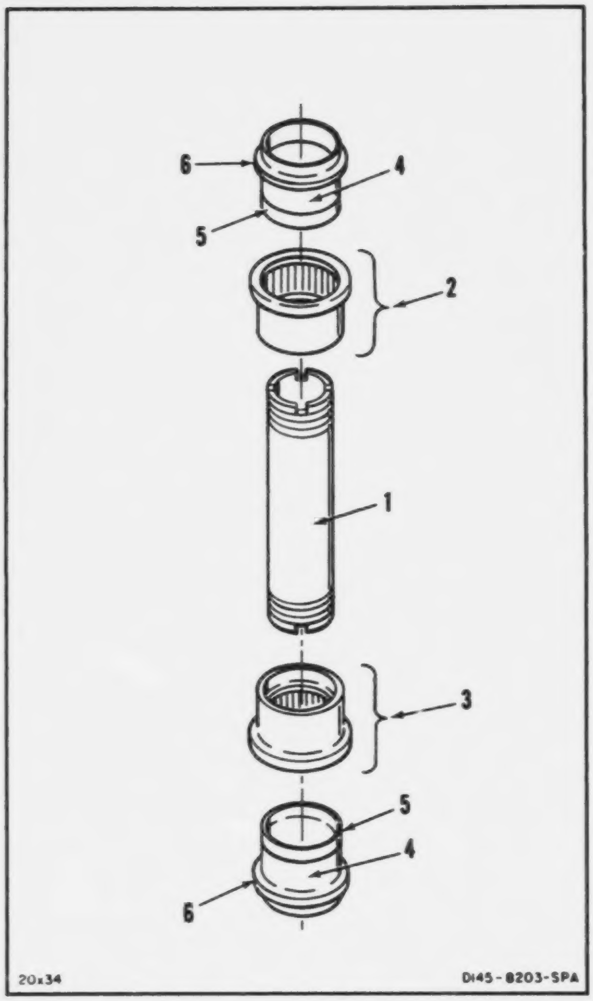
Materials:
None

Personnel Required:
Inspector

Equipment Condition:
Off Helicopter Task

---

1. **Check pin (1), upper bearing (2), and lower bearing (3)** for vertical scores or horizontal marks. Damage shall not exceed **0.0005 inch in depth.**
2. **Check wear surfaces (4) of inner races (5)** for spalling, corrosion, or other damage. There shall be no spalling or corrosion. There shall be no scores or other marks deeper than 0.0005 inch. Scores and circumferential marks not deeper than 0.0005 inch may be blended out. Use abrasive paper (E8). Any scratches not deeper than those caused by abrasive paper (E5) are acceptable without rework.
3. **Check upper and lower surfaces of flanges (6)** for cracks. There shall be no cracks.



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5-37 INSPECT VERTICAL HINGE PIN AND BEARINGS (Continued) 5-37

4. **Check rollers (7) and outer races (8) of bearings (2 or 3)** as follows:

   a. Insert drift through oil hole (9). Push rollers (7) out of cage (10) as necessary to check wear surface (11).

   NOTE

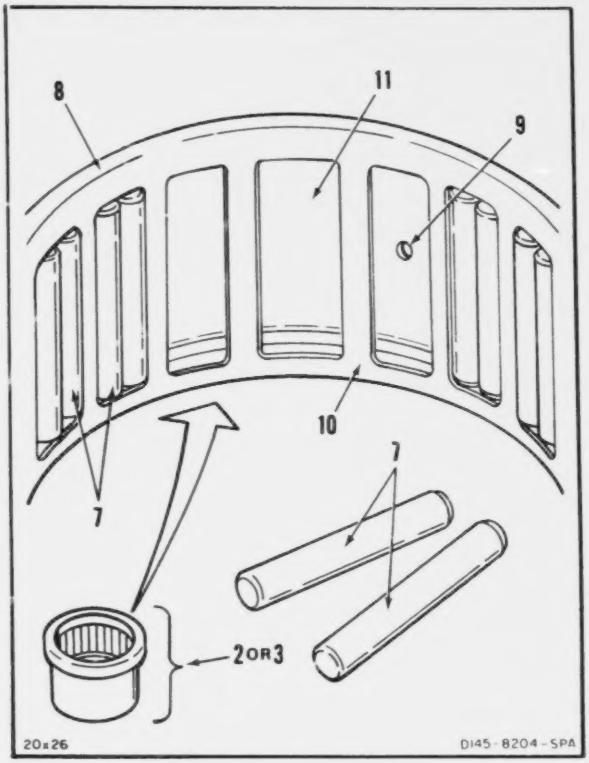
   A worn cage that allows rollers to be loose or fall out is not cause for bearing replacement.

   b. Check wear surface (11) and rollers (7) for spalling, corrosion, or other damage. There shall be no damage.

5. **Install rollers (7)** in cage (10).

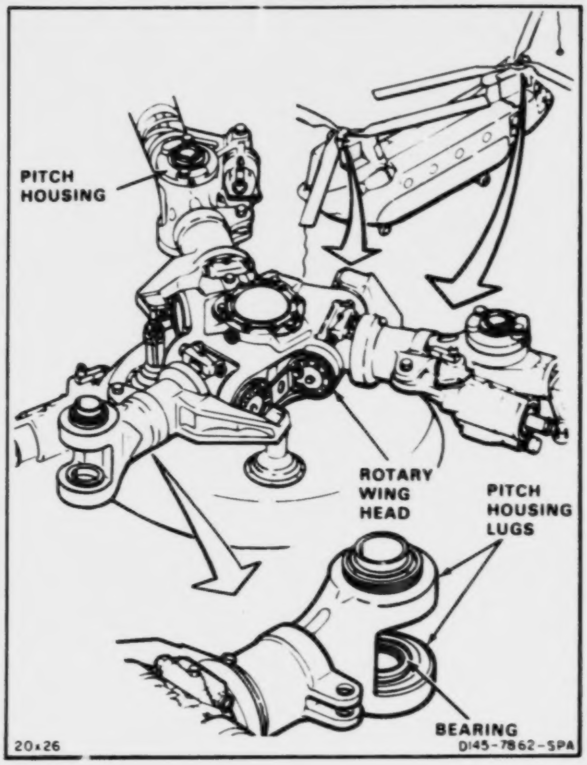
FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-38 ROTATE VERTICAL HINGE PIN BEARING 5-38


PITCH HOUSING
ROTARY WING HEAD
PITCH HOUSING LUGS
BEARING
20x26
D145-7862-SPA

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267

Materials:
Pencil, Marking (E271)
Paper Tag (E264)

Personnel Required:
68D10 Aircraft Powertrain Repairer
68D20 Aircraft Powertrain Repairer

References:
Task 5-36
Task 5-39

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied Down (Task 1-26)
Pylon or Forward Work Platform Open (Task 2-2)
Rotary-Wing Blade Removed As Required (Task 5-64)
One Vertical Hinge Pin Oil Tank Removed (Task 5-28)

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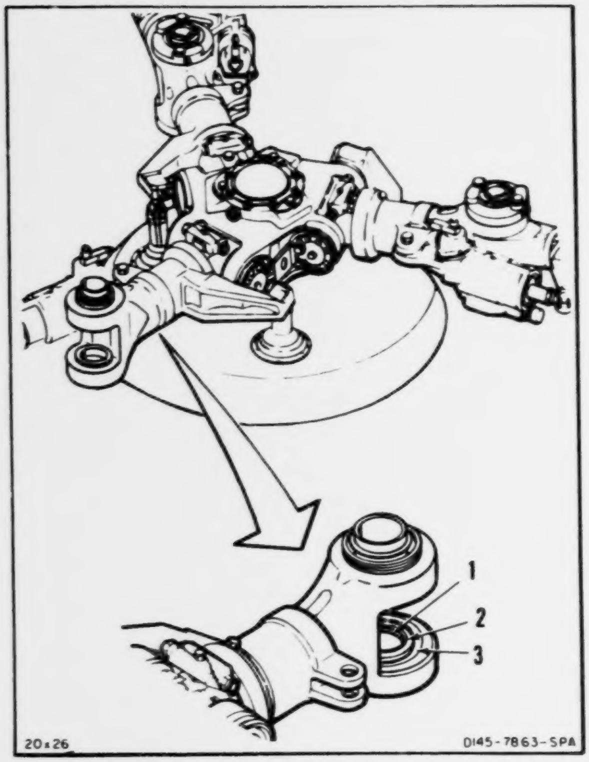
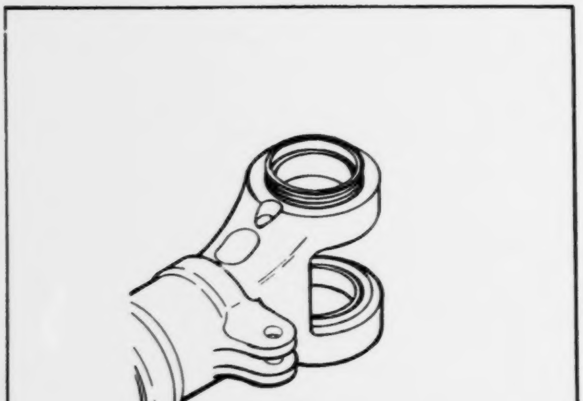
5-38 ROTATE VERTICAL HINGE PIN BEARING (Continued) 5-38



NOTE

Procedure is same to rotate any vertical hinge pin bearing. Lower bearing is shown in task.

1. **Matchmark inner race (1), outer race (2), and lug liner (3).** Use marking pencil (E271).



2. **Remove bearing (4)** (Task 5-36).
3. If more than one bearing (4) is removed, tag bearings. Use paper tag (E264) (5) and marking pencil (E271). Mark as follows:
   a. Rotary-wing head serial number.
   b. Pitch housing color.
   c. Upper or lower bearing.
4. **Inspect bearing (4)** (Task 5-39).
5. Remove tag (5), and install bearing (4) with matchmarks rotated 180 degrees from original position (Task 5-39).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-39 INSTALL VERTICAL HINGE PIN BEARING 5-39

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267

Bearing and Seal Puller (T10)

Heater Gun

Kevlar Gloves (E187)

Materials:

Cloth (E120)

Dry Cleaning Solvent (E162)

Gloves (E186)

Lubricating Oil (E254)

Temperature Indicating Strips (E413)

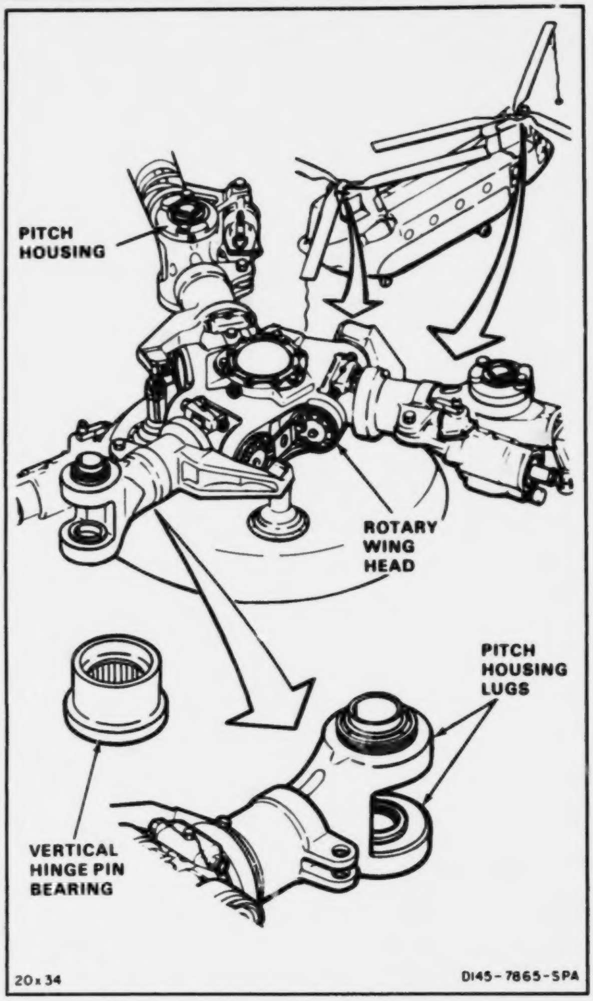
Personnel Required:

Aircraft Powertrain Repairer (2)

Inspector

References:

TM 55-1520-240-23P



WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Get medical attention for eyes.

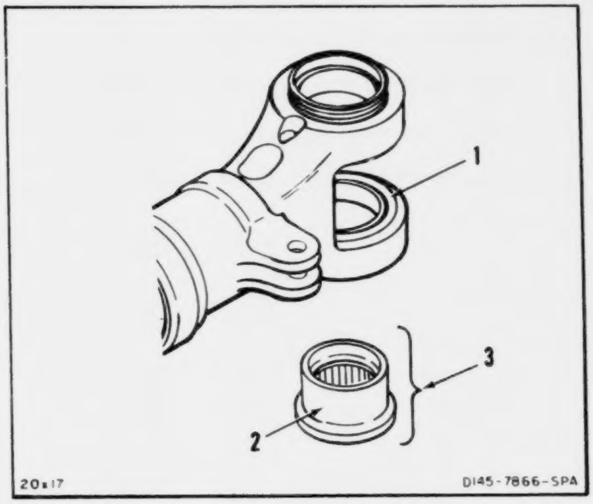
NOTE

- Procedure is same to install vertical hinge pin bearing in any pitch housing lug. Lower lug is shown in task.
- Install bearing in same lug from which removed.

GO TO NEXT PAGE

5-39 INSTALL VERTICAL HINGE PIN BEARING (Continued) 5-39

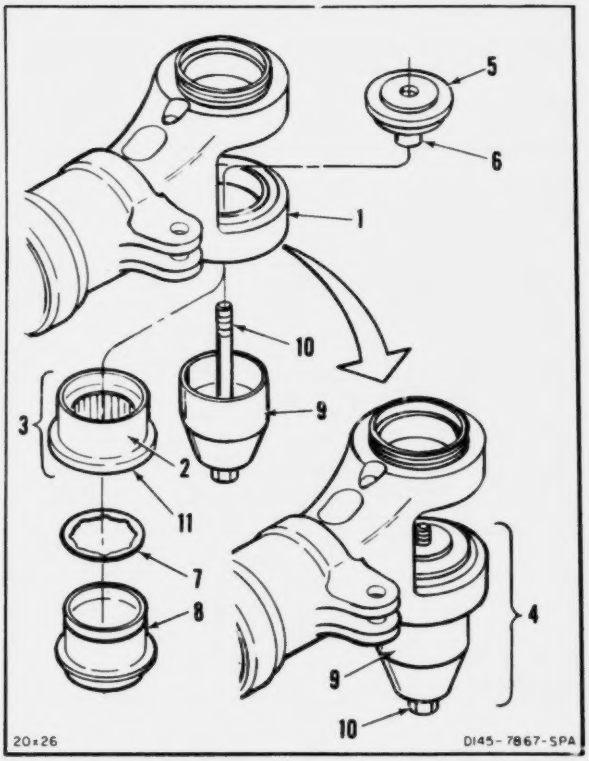
1. Clean lug (1) and outer race (2) of bearing (3). Use cloth (E120) damp with solvent (E162). Remove tag, if tied to bearing. Use gloves (E186).



CAUTION

Do not exceed 250° F (121° C) when heating lug. Lug will be damaged.

2. **Heat lug (1) to 240° F (116° C).** Use heater gun. Use temperature indicating strips (E413) to monitor temperature. Wear gloves (E187).
3. **Install bearing and seal puller (T10) (4)** as follows:
   a. Position base (5) on lug (1) with base (5) on lug (1) with boss (6) down.
   b. Position thrust washer (7) on inner bearing race (8). Position bearing (3) on thrust washer (7).
   c. Lubricate outside of outer bearing race (2). Use lubricating oil (E254).
   d. Position thrust washer (7), inner race (8), and bearing on driver (9).
   e. Position bolt (10) through lug (1). If bearing (3) is not being rotated align matchmarker on outer race (2) and lug.
   f. Install bolt (10) in base (5).
4. Install bearing (3) by tightening bolt (10) until shoulder (11) is seated.
5. Remove base (5), bolt (10), and driver (9).



INSPECT

GO TO NEXT PAGE

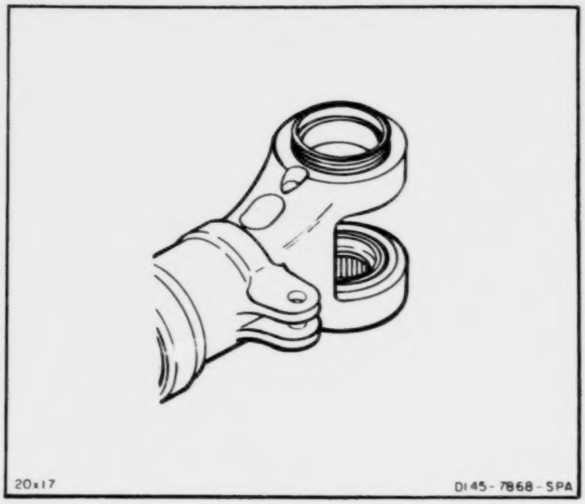
5-39 INSTALL VERTICAL HINGE PIN BEARING (Continued) 5-39

FOLLOW-ON MAINTENANCE:

Install vertical hinge pin oil tank (Task 5-29).

Install rotary-wing blade (Task 5-84).

Close work platforms (Task 2-2).



END OF TASK

5-40 REMOVE HORIZONTAL HINGE PIN BEARING CAP 5-40

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Torque Wrench Socket (T5)
Drive Handle, 3/4-Inch
Bolt, 3/8-24 UNF, 1 13/16-Inches Long
Washer, 3/8-Inch ID, 1/16-Inch Thick
Socket, 2-Inch, 3/4-Inch Drive

Materials:

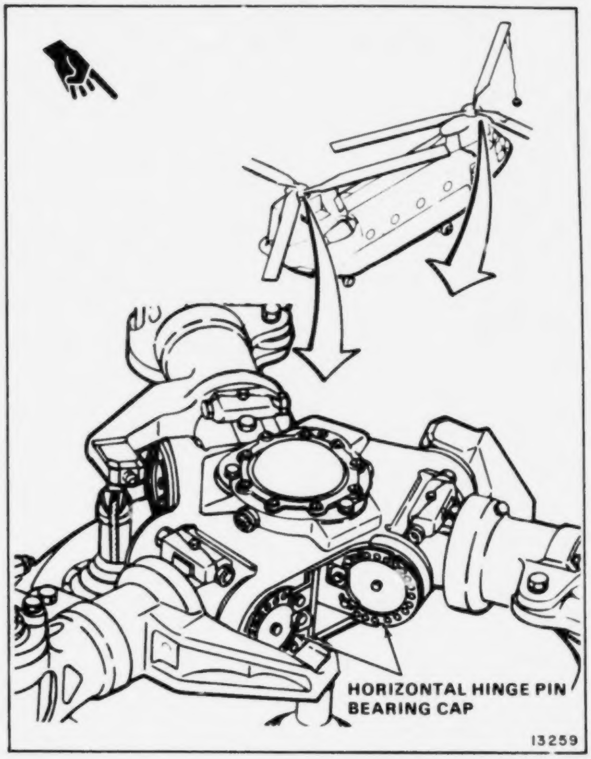
None

Personnel Required:

Aircraft Powertrain Repairer

Equipment Condition:

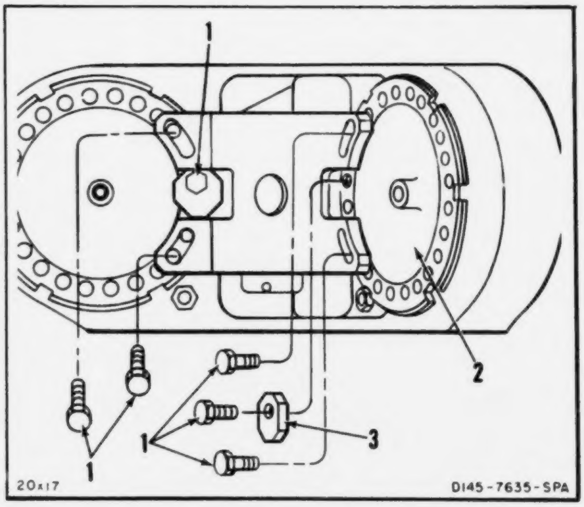
None



NOTE

- Procedure is same to remove any horizontal hinge pin bearing cap. There are six caps on a rotary-wing head.
- Remove key only from cap being removed. Locking beam can be removed with one key installed.

1. Remove lockwire from six bolts (1).
2. **Remove five bolts (1)** from horizontal hinge pin bearing caps (2). **Remove key (3).**



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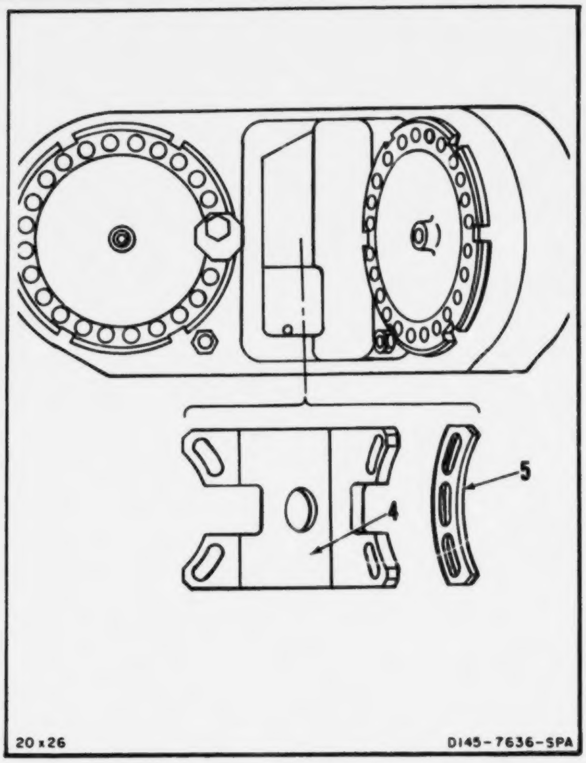
5-40 REMOVE HORIZONTAL HINGE PIN BEARING CAP (Continued) 5-40

3. **Remove locking beam (4) and laminated shim (5), if installed.**

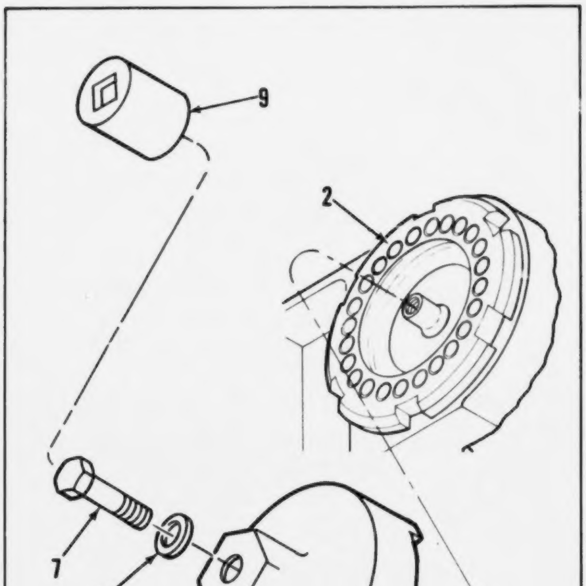


4. **Install torque wrench socket (T5) (6)** on bearing cap (2).

4.1. Install bolt (7), with washer (8) in wrench socket (6). Hand-tighten bolt.

4.2. Install socket (9) over hex of wrench socket (6).

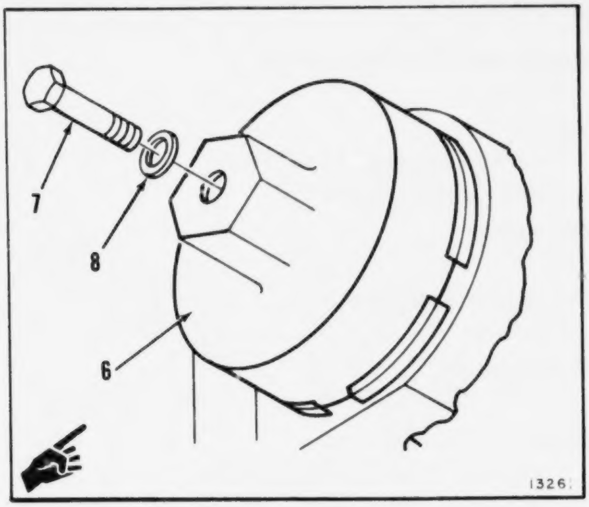
5. Remove bearing cap (2). Use 3/4-inch drive handle.



GO TO NEXT PAGE

5-40 REMOVE HORIZONTAL HINGE PIN BEARING CAP (Continued) 5-40

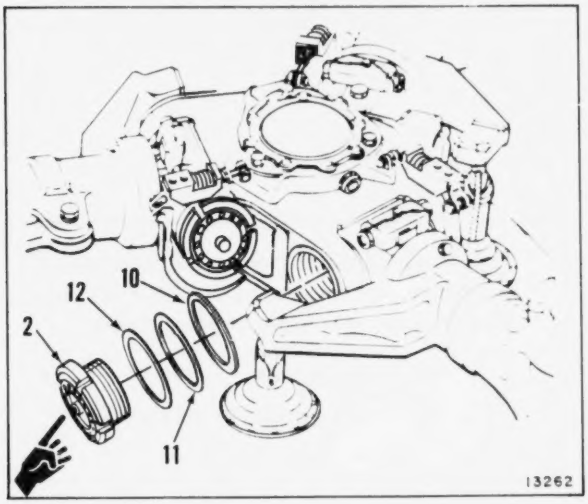
6. Remove bolt (7) and washer (8). Remove torque wrench socket (T5) (6).



NOTE

Shim installed on trailing cap only.

7. Remove laminated shim (10), washer (11), and packing (12) from cap (2).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-40.1 INSPECT INSTALLED HORIZONTAL HINGE PIN BEARINGS 5-40.1

INITIAL SETUP

Applicable Configurations:
All

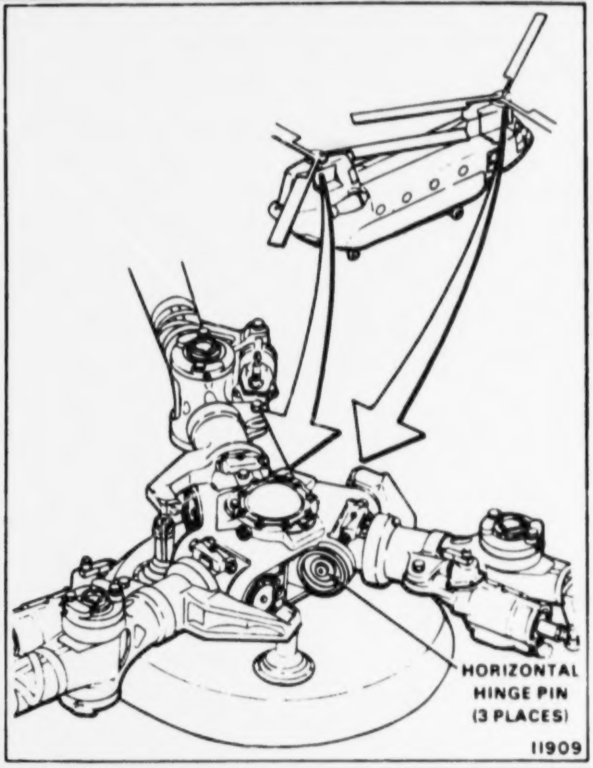
Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:
None

Personnel Required:
Inspector

References:
TM 55-1520-240-23P

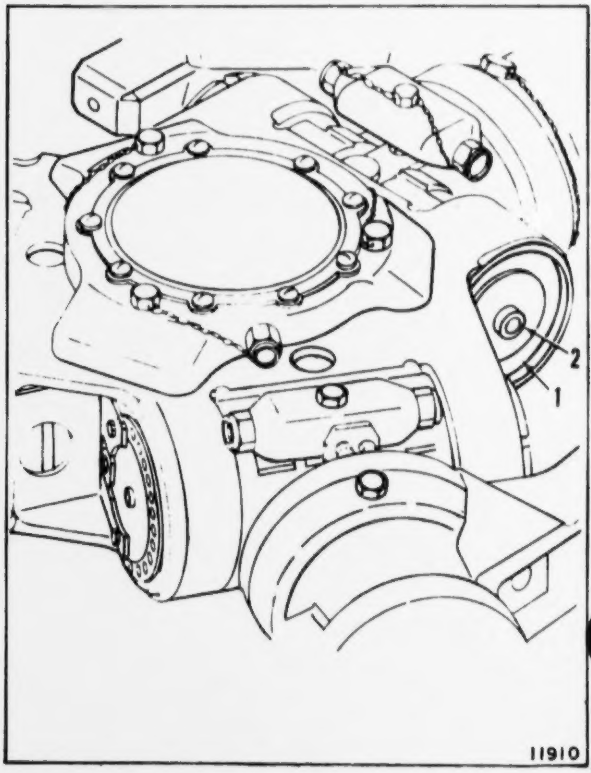
Equipment Condition:
Horizontal Hinge Pin Bearing Cap
Removed (Task 5-40)



1. Inspect area around lower part of bearing (1) at each end of hinge pin (2). Check for debris, indicating that a bearing has failed.

NOTE

Extremely fine copper or steel residue is normal.



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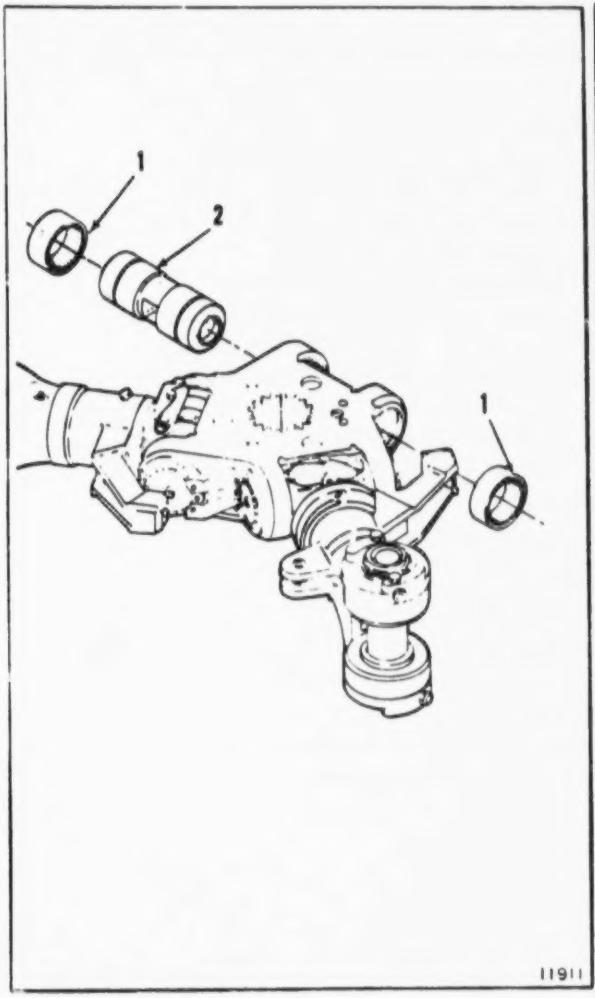
5-40.1 INSPECT INSTALLED HORIZONTAL HINGE PIN BEARINGS (Continued) 5-40.1

2. If bearing debris is found, remove hinge pin (2) and bearings (1) (Task 5-44). Inspect pin and bearings for spalling, corrosion, and other damage (Task 5-45).
3. Replace components that show signs of damage (Task 5-46).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-41 INSTALL HORIZONTAL HINGE PIN BEARING CAP

INITIAL SETUP

Applicable Configurations:

All

Tools:

- Technical Inspection Tool Kit, NSN 5180-00-323-5114
- Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
- Dial Indicator, 0 to 0.030 Inch
- Torque Wrench Socket (T5)
- Torque Wrench, 0-600 Foot-Pounds
- Torque Wrench, 100-750 Inch-Pounds
- Bolt, 3/8-24 UNF, 1 13/16-Inches Long
- Washer, 3/8-Inch ID, 1/16-Inch Thick
- Socket, 2-Inch, 3/4-Inch Drive

Materials:

Lockwire (E231)

Parts:

Packing

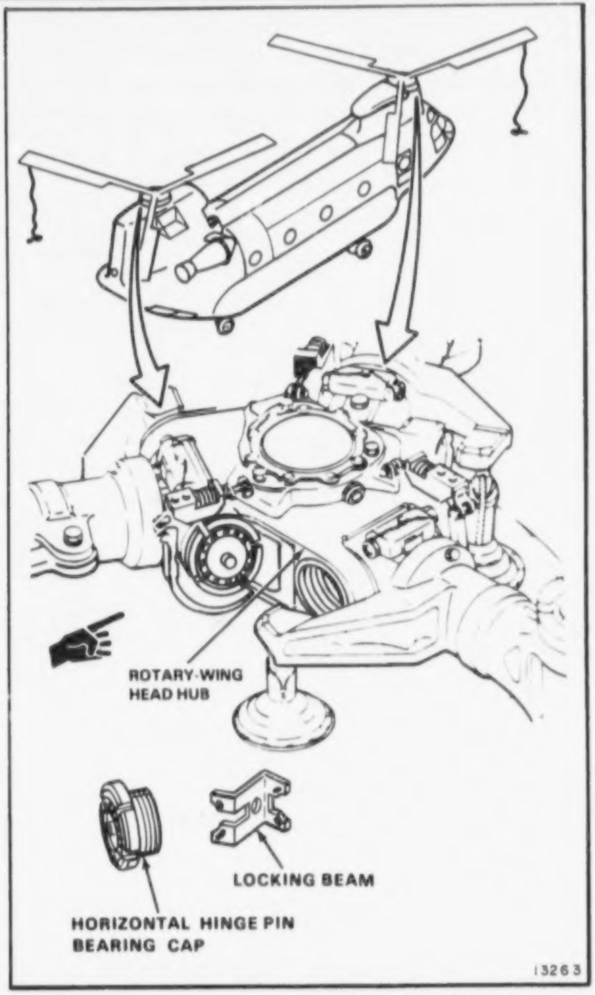
Personnel Required:

Aircraft Powertrain Repairer

Inspector

References:

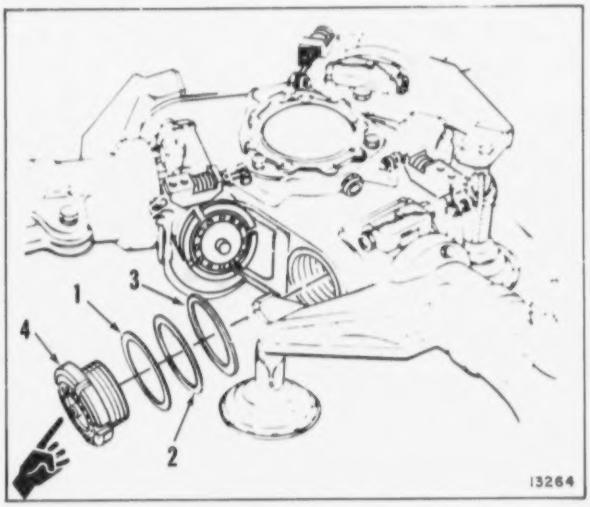
TM 55-1520-240-23P



NOTE

- Procedure is same to install any horizontal hinge pin bearing cap.
- Shim is installed on trailing cap only.

1. Install washer (1), shim (2), and packing (3) on horizontal hinge pin bearing cap (4). **Install cap.**



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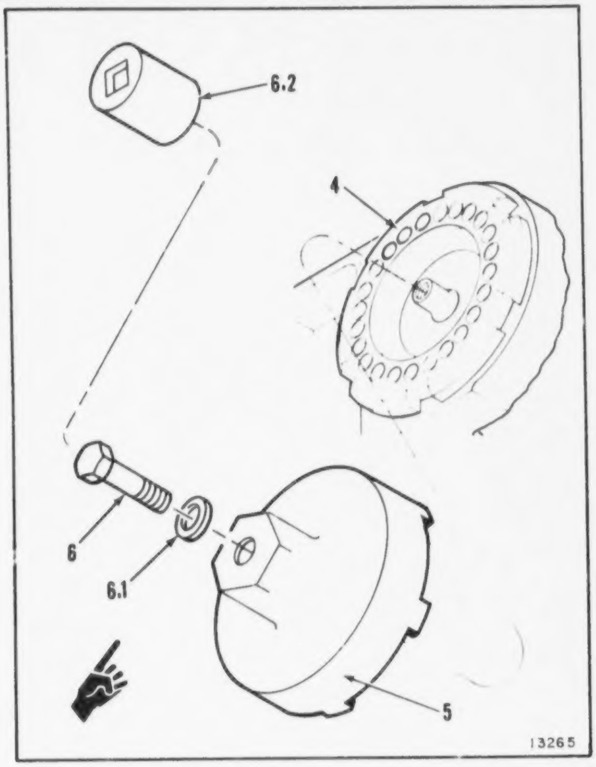
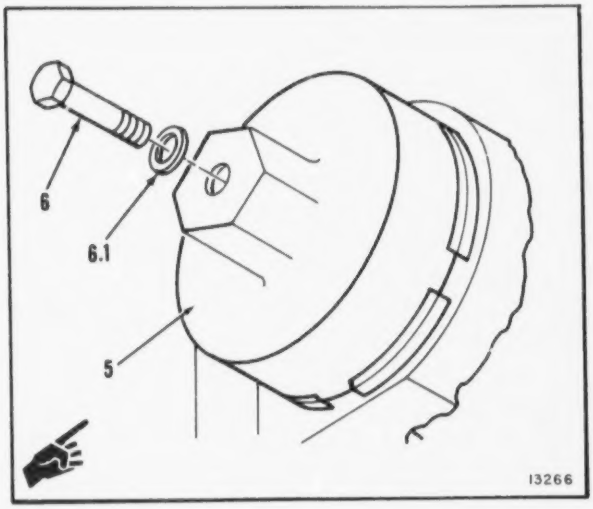
5-41 INSTALL HORIZONTAL HINGE PIN BEARING CAP (Continued) 5-41

2. **Install torque wrench socket (T5) (5)** on bearing cap (4).
3. **Install bolt (6)** with washer (6.1) in wrench socket (5). Hand-tighten bolt.
4. **Install socket (6.2)** over hex of wrench socket (5).

4.1. **Torque** bearing **cap (4) to 590 foot-pounds.**



4.2. **Remove bolt (6)** and washer (6.1). **Remove** torque wrench **socket (5).**



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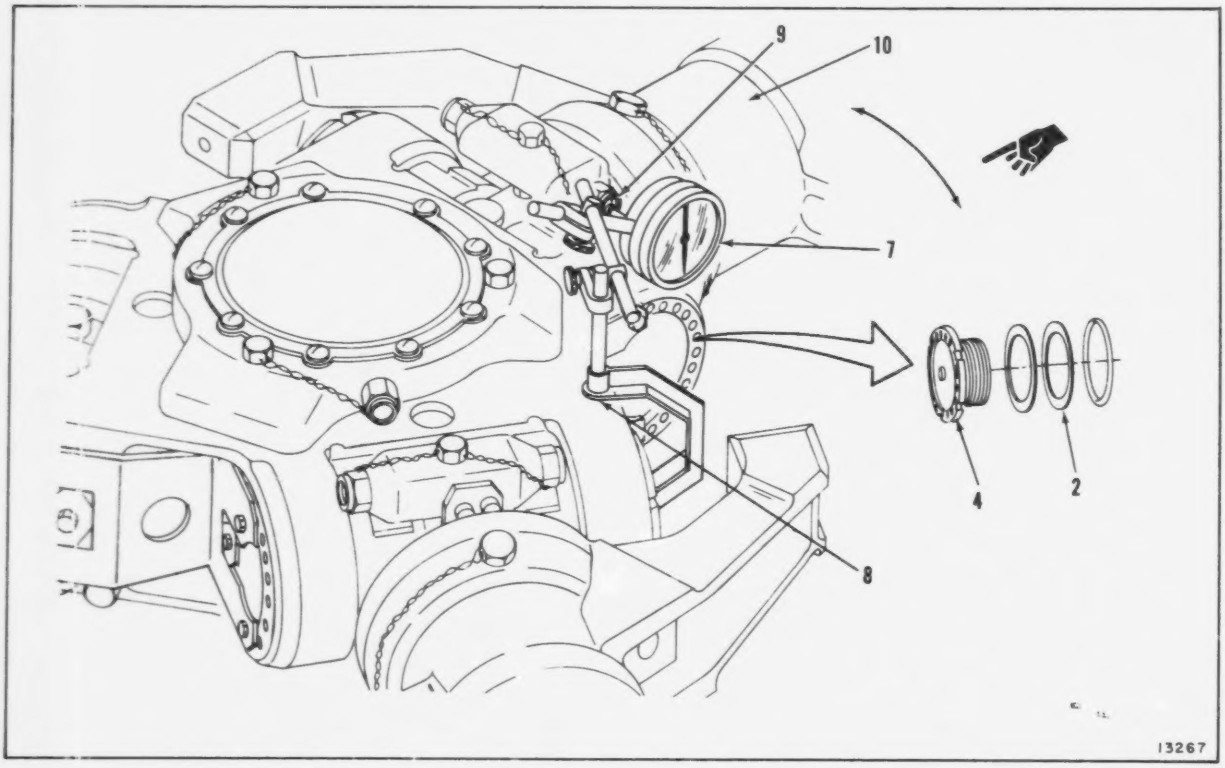
5-41 INSTALL HORIZONTAL HINGE PIN BEARING CAP (Continued) 5-41

5. With leading and trailing caps (4) installed, **check horizontal pin clearance** as follows:
   a. Attach dial indicator (7) to rotor hub (8).
   b. Position point of indicator (7) against vertical hinge pin oil tank sight indicator (9).
   c. Push pitch housing (10) away from dial indicator (7) as far as possible.
   d. Hold housing (10) in position, and set dial indicator (7) to 0.
   e. Pull housing (10) toward dial indicator (7) as far as possible.
   f. Hold housing (10) in position and read dial indicator (7). Remove indicator. If reading is between 0.004 and 0.008 inch, go to step 6. If reading is not within these limits, remove trailing cap (4) and change thickness of shim (2) as required.
   g. Replace cap (4). Repeat steps 1 through 4.



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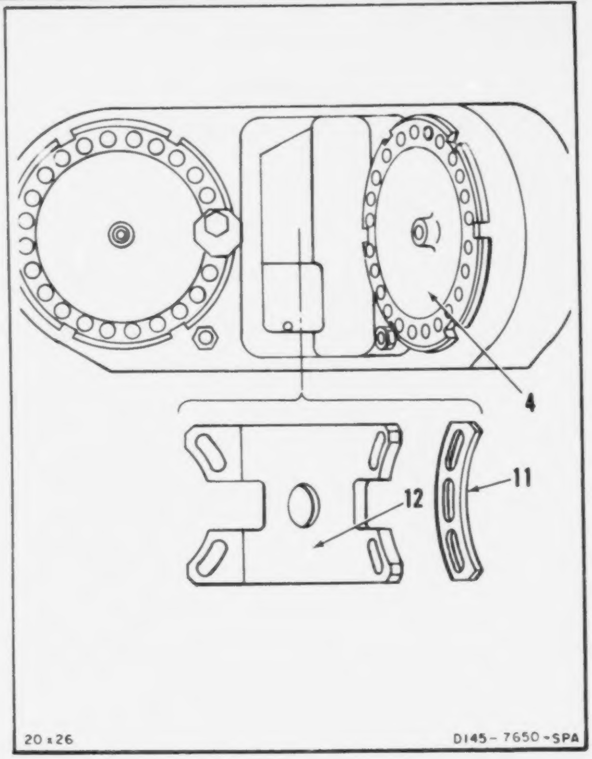
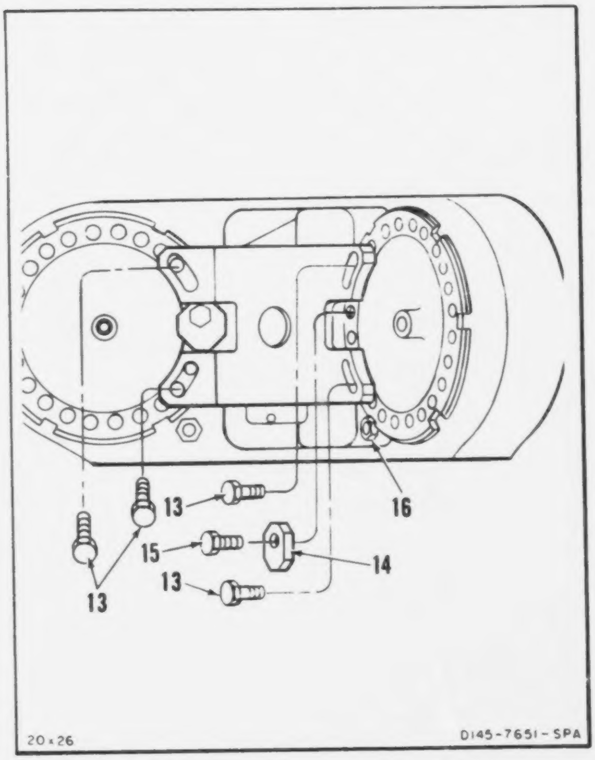
5-41 INSTALL HORIZONTAL HINGE PIN BEARING CAP (Continued) 5-41


4
12
11
20 x 26
D145-7650-SPA

6. **On trailing cap (4) only, position laminated shim (11).**
7. **Position locking beam (12) on bearing cap (4).**

NOTE

Key on leading cap may have to be removed to align locking beam.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13
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13
13
16
14
20 x 26
D145-7651-SPA

8. **Install four bolts (13)** and handtighten. **Position key (14) and install remaining bolt (15). Torque five bolts to 60 inch-pounds.**
9. Lockwire bolts (9 and 11) and filler cap (16). Use lockwire (E231).

INSPECT

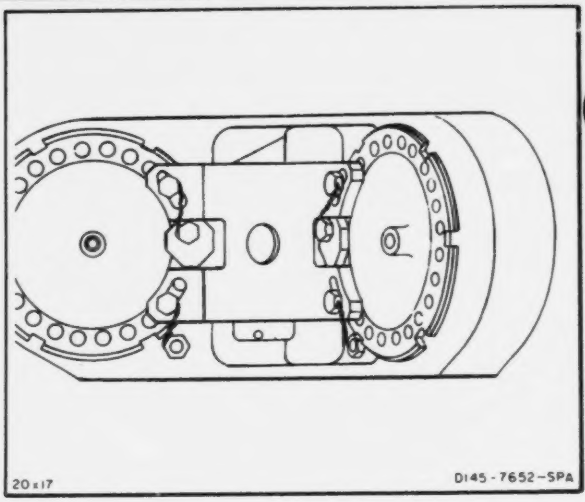
GO TO NEXT PAGE

5-41 INSTALL HORIZONTAL HINGE PIN BEARING CAP (Continued) 5-41

FOLLOW-ON MAINTENANCE:

Install hub oil tank (Task 5-17).

Install pitch varying housing (Task 5-23).



END OF TASK

5-42 REMOVE HORIZONTAL HINGE PIN OIL SEALS 5-42

INITIAL SETUP

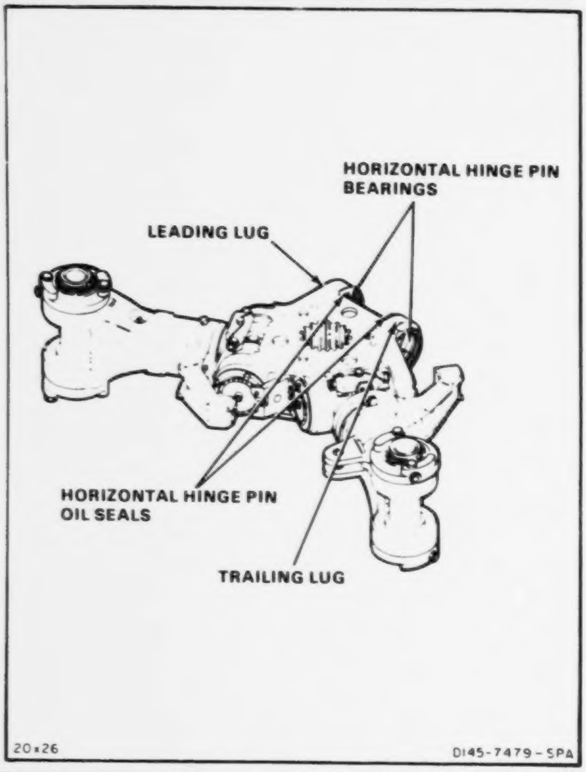
Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit,
NSN 5180-00-003-5267
Phenolic Drift, 1/2-Inch X 1/2-Inch x 10-Inches

Materials:
None

Personnel Required:
68D10 Aircraft Powertrain Repairer

Equipment Condition:
Off Helicopter Task
Pitch Varying Housing Removed (Task 5-22)
Horizontal Hinge Pin Bearing Caps Removed (Task 5-40)
Horizontal Hinge Pin Removed (Task 5-44)


HORIZONTAL HINGE PIN BEARINGS
LEADING LUG
HORIZONTAL HINGE PIN OIL SEALS
TRAILING LUG
20x26
D145-7479-SPA

CAUTION

Do not strike bearings with hard tool. Bearings can be damaged.

NOTE

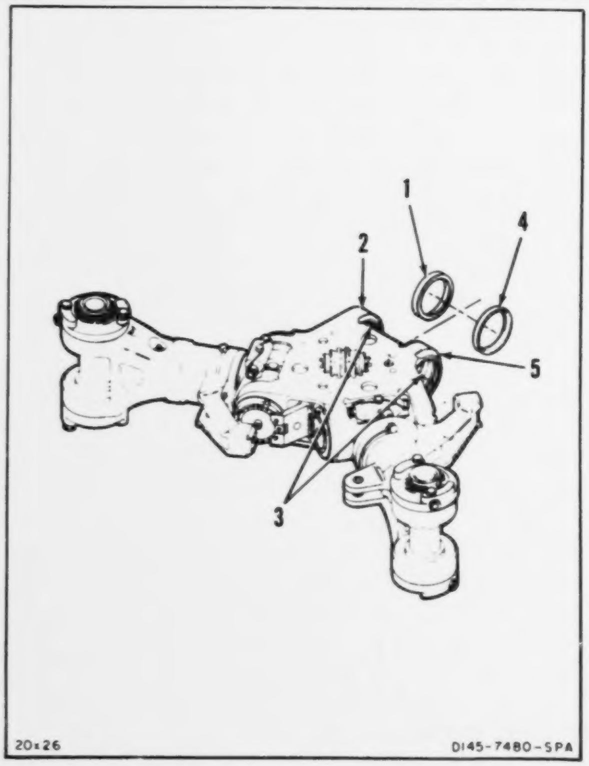
Procedure is same to remove any horizontal hinge pin oil seal. There are six horizontal hinge pin oil seals in each rotary-wing head. Forward rotary-wing head is shown here.

1. **Tap seal (1) from leading lug (2).** Use phenolic drift. Do not strike bearing (3).
2. **Tap seal (4) from trailing lug (5).** Use phenolic drift. Do not strike bearing (3).

FOLLOW-ON MAINTENANCE:

None

END OF TASK


1
2
3
4
5
20x26
D145-7480-SPA

5-43 INSTALL HORIZONTAL HINGE PIN OIL SEALS 5-43

INITIAL SETUP

Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Bearing and Seal Pusher (T6)

Materials:
Dry Cleaning Solvent (E162)
Cloth (E120)
Sealant (E333)
Gloves (E186)

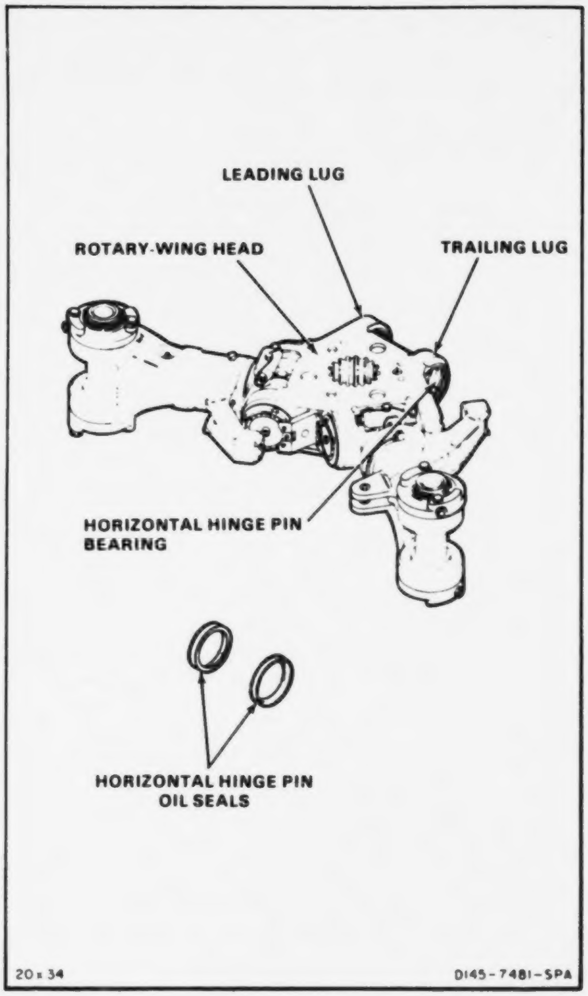
Personnel Required:
68D10 Aircraft Powertrain Repairer
68D20 Aircraft Powertrain Repairer
67U30 Inspector

References:
TM 55-1520-240-23P

General Safety Instructions:

WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes. Use gloves (E186).


LEADING LUG
ROTARY-WING HEAD
TRAILING LUG
HORIZONTAL HINGE PIN BEARING
HORIZONTAL HINGE PIN OIL SEALS
20 x 34
D145-7481-SPA

GO TO NEXT PAGE

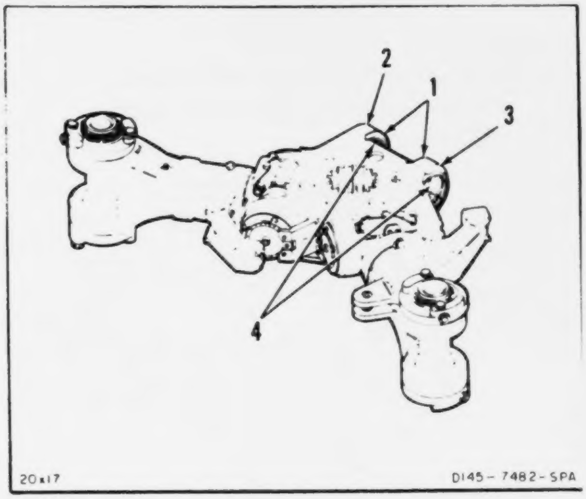
5-43 INSTALL HORIZONTAL HINGE PIN OIL SEALS (Continued) 5-43

CAUTION

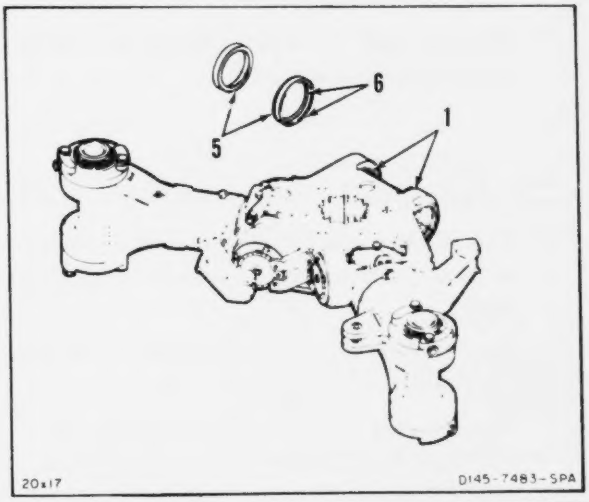
Do not contaminate horizontal hinge pin bearings. Bearings can be damaged.

NOTE

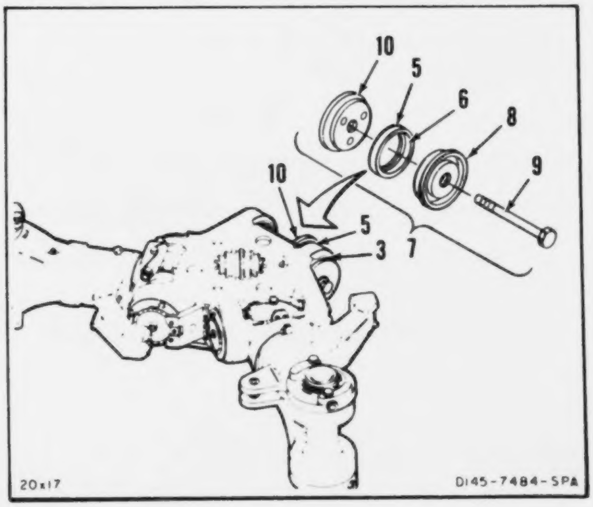
Procedure is same to install any horizontal hinge pin oil seal. There are six horizontal hinge pin seals on rotary-wing head. Installation of seals on forward head is shown here.



1. Clean seal seat areas (1) on leading and trailing lugs (2 and 3). Use cloth (E120) damp with dry cleaning solvent (E162). Do not wash contaminants into bearings (4). Wear gloves (E186).



2. Clean seals (5). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
3. **Check seal lips (6)** for nicks or scratches. Use magnifying glass.
4. **Apply** thin, even coat of **sealant (E333)** to seal seats (1) and metal outside of seals (5). Wear gloves (E186).



5. **Install bearing and seal pusher (T6) (7)** on trailing lug (3) as follows:
   a. Install seal pilot (8) on bolt (9).
   b. Position seal (5) on bearing and seal pilot (10) with seal lips (6) facing away from pilot.
   c. Position bearing and seal pilot (10), and seal (5), on inboard side of lug (3).
   d. Install bolt (9) in bearing and seal pilot (10).

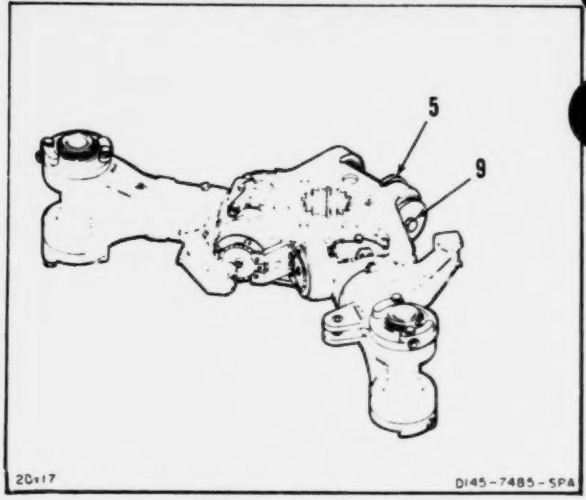
GO TO NEXT PAGE

5-43 INSTALL HORIZONTAL HINGE PIN OIL SEALS (Continued) 5-43

CAUTION

Do not nick, cut, or twist seal. Damaged seals can result in oil leakage.

6. Turn bolt (9) to **install seal (5).**



7. **Remove bolt (9), seal pilot (8), and bearing and seal pilot (10).**

NOTE

Seal can extend up to 0.015-inch past lug face if seated all around.

8. **Check that seal (5) is flush with lug (3), or extends from lug no more than 0.015-inch.**
9. Repeat steps 5 through 8 for seal (5) on leading lug (2).
10. Wipe sealant squeezeout from lug (2 or 3). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
11. Allow sealant (E333) to cure for 1 hour at 72°F (22°C).

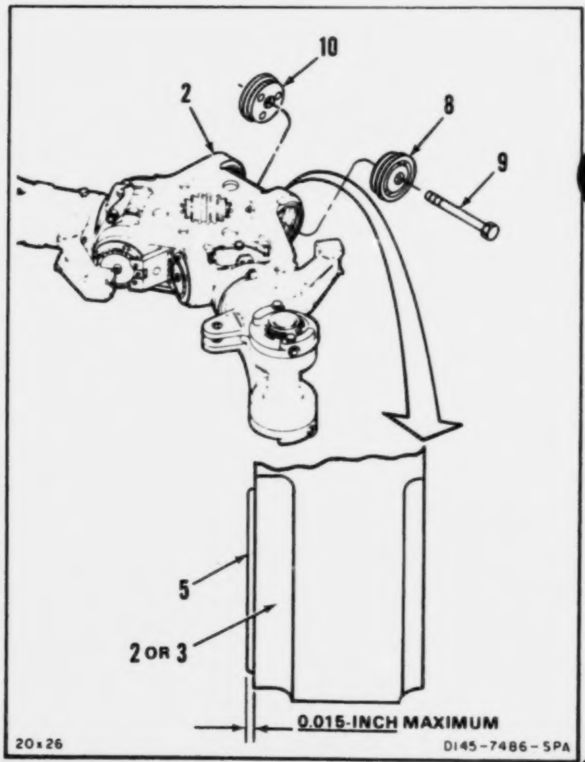
INSPECT

FOLLOW-ON MAINTENANCE:

Install horizontal hinge pin (Task 5-46).

Install horizontal hinge pin bearing caps (Task 5-41).

Install pitch varying housing (Task 5-23).



END OF TASK

5-44 REMOVE HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING AND PIN BEARINGS 5-44

INITIAL SETUP

Applicable Configurations:
All

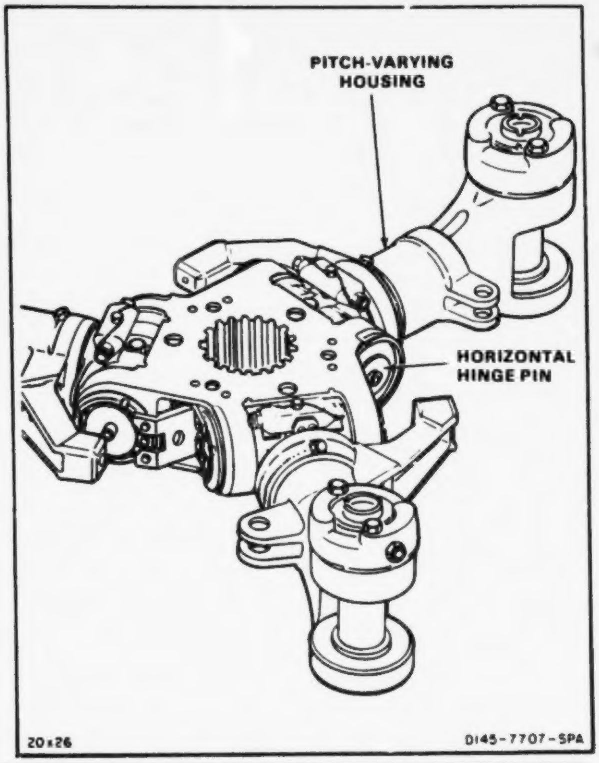
Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Horizontal Hinge Pin Pusher (T87)
Bolt, 3/8-24 X 5-Inches
Drift (2), Brass, 1/2-Inch Diameter Flattened At One End
Horizontal Hinge Pin Bearing Puller (T9)
Two Quart Container

Materials:
Grease (E190)
Pencil, Marking (E271)
Gloves (E186)

Personnel Required:
Aircraft Powertrain Repairer (2)

References:
Task 5-42

Equipment Condition:
Off Helicopter Task
Horizontal Hinge Pin Bearing Caps Removed (Task 5-40)
Hub Oil Tank Removed (Task 5-15)



NOTE

Procedure is same to remove any horizontal hinge pin, pitch-varying housing, and pin bearing assembly. There are three horizontal hinge pins, six pin bearings, and three pitch-varying housings on a rotary-wing head. Forward head is shown here.

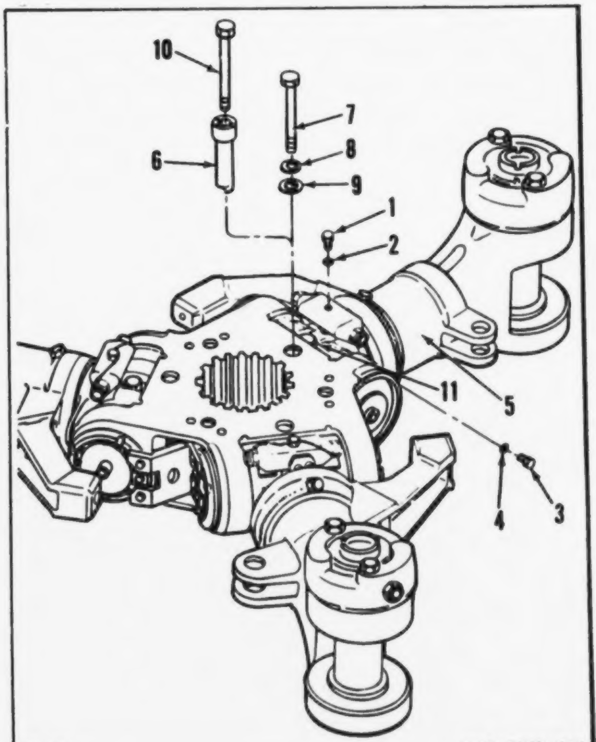
REMOVE PITCH-VARYING HOUSING

1. Remove lockwire. Remove plug (1) and packing (2).
2. Remove lockwire. Remove plug (3) and packing (4). **Drain oil** into container.
3. Remove lockwire from tie-bar pin (6). Remove bolt (7), washers (8), and retaining washer (9).

CAUTION

Do not tap pin down to remove. Retaining bolt nut plate will be damaged.

4. Install 3/8-inch x 24 thread x 5-inch bolt (10) in pin (6) and pull pin from pitch-varying shaft (11). Remove bolt.



GO TO NEXT PAGE

5-44 REMOVE HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING AND PIN BEARINGS (Continued) 5-44

CAUTION

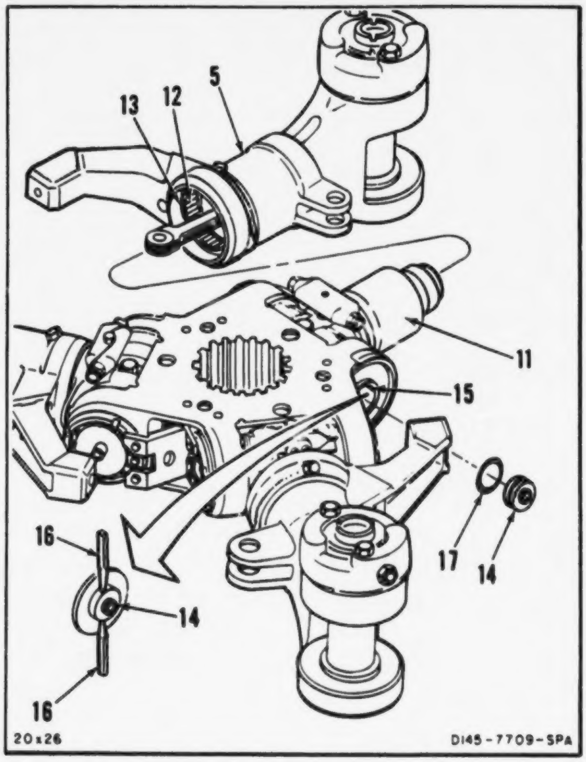
Pitch housing and other parts must be installed in same location. Parts must be tagged.

5. Pull pitch-varying housing (5) from pitch-varying shaft (11).

WARNING

Solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Get medical attention for eyes.

6. Check that rollers (12) are in cage (13). Clean and position rollers if needed. Use cloth (E120) damp with solvent (E162). Apply grease (E190) to prevent rollers from falling.



REMOVE PITCH-VARYING SHAFT AND HORIZONTAL HINGE PIN

7. **Pry two end seal plugs (14) from horizontal hinge pin (15).** Use two drifts (16). Remove packings (17).

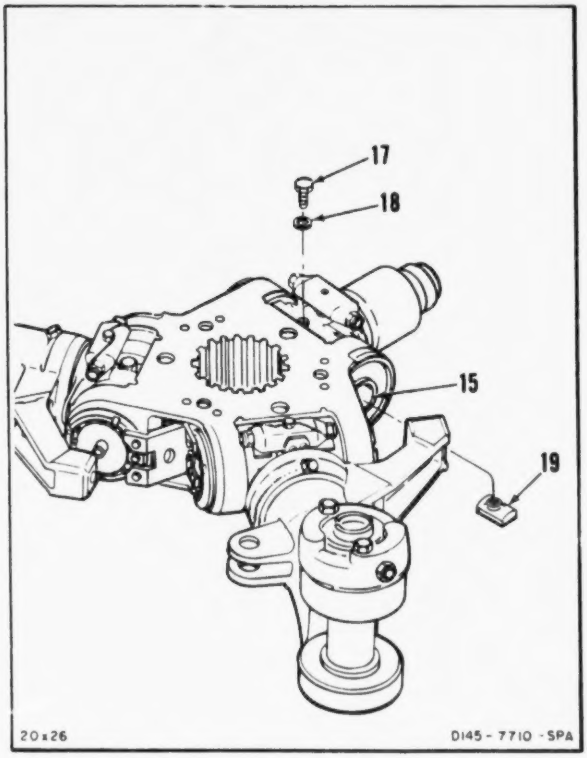
GO TO NEXT PAGE

5-44 REMOVE HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING AND PIN BEARINGS (Continued) 5-44

CAUTION

Do not install horizontal hinge pins, thrust washers, or bearings in wrong lugs. Binding or excessive play can occur if parts are not installed as removed. Store parts together with caps, shim, and trailing washers.

8. Matchmark horizontal hinge pin (15) so it can be replaced in original position or rotated 180 degrees. Use marking pencil (E271).
9. Remove lockwire from shoulder bolt (17). Remove bolt, washer (18), and special nut (19).



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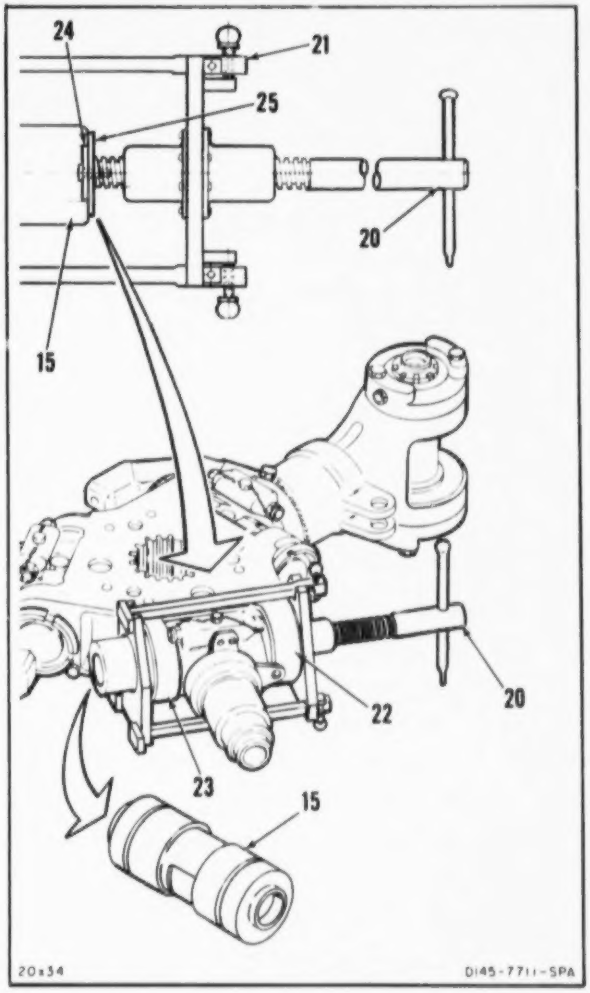
5-44 REMOVE HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING AND PIN BEARINGS (Continued) 5-44



CAUTION

Do not handle horizontal hinge pin. Do not allow dirt or abrasives to contact pin. Dirt or abrasives can contaminate pin. Fingerprints can cause corrosion.

10. Turn jack (20) on horizontal pin pusher (T87) (21) all the way out.
11. **Install pin pusher (T87) (21)** over lugs (22 and 23) as follows:
    a. Position pin pusher (T87) (21) on lugs (22 and 23), with jack (20), on side of leading lug (22).

    NOTE

    On aft rotary-wing head, leading lug faces opposite direction.

    b. Turn jack (20) clockwise until washer (24) is positioned in pin (15), and pad (25) is centered on pin.
12. Turn jack (20) to **remove pin (15)** from lugs (22 and 23).

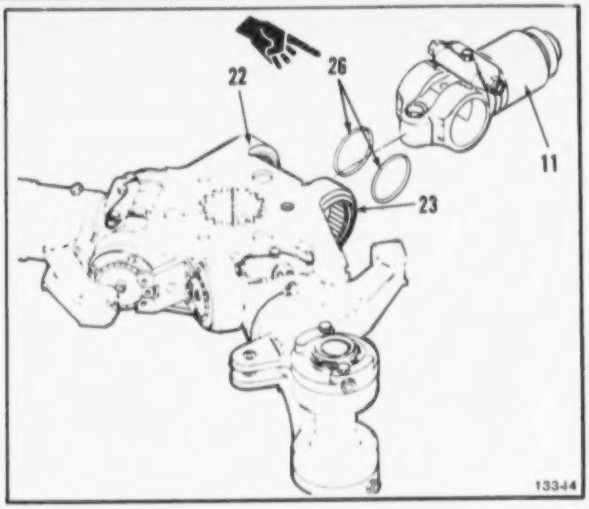
GO TO NEXT PAGE

5-44 REMOVE HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING AND PIN BEARINGS (Continued) 5-44

CAUTION

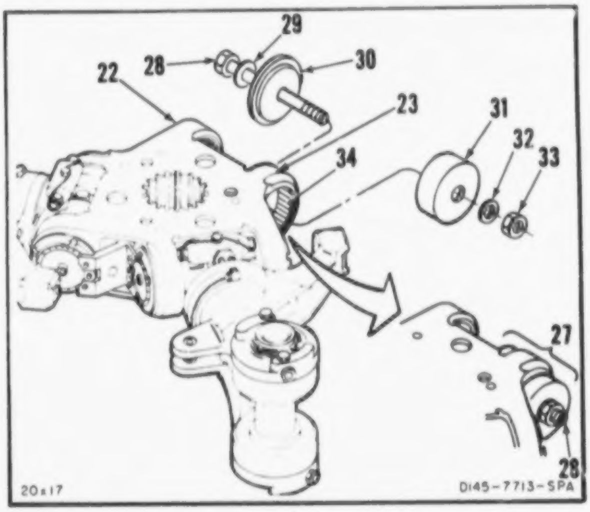
Do not handle shaft or bearings without gloves. Fingerprints will cause corrosion.

13. **Remove pitch-varying shaft (11)** from lugs (22 and 23). Wear gloves (E186).
14. Remove seals (26) from lug (22). Remove seals (26) from lug (23) (Task 5-42).


22
26
11
23
13344

REMOVE HORIZONTAL HINGE PIN BEARINGS

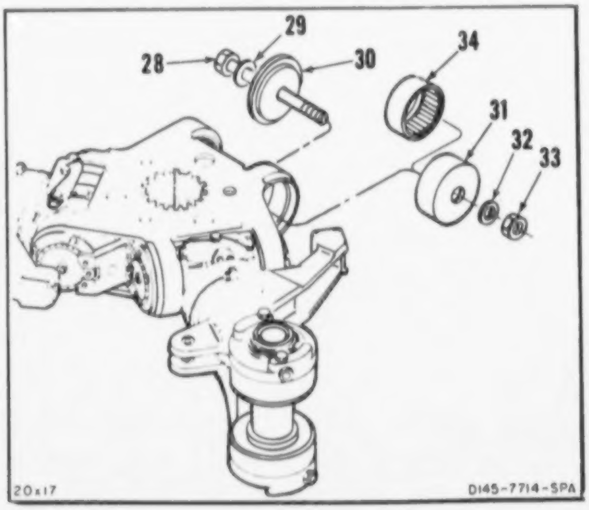
15. **Install horizontal hinge pin bearing puller (T9) (27)** as follows:
    a. Install bolt (28), washer (29), and pilot (30) at inside of lug (22 or 23).
    b. Install sleeve (31), washer (32), and nut (33).
16. Tighten bolt (28) to remove bearing (34) from lug (22 or 23).


29
22
28
30
23
31
32
33
34
27
28
20x17
D145-7713-SPA

17. Remove nut (33), washer (32), sleeve (31), bearing (34), bolt (28), washer (29), and pilot (30). **Remove bearing** from sleeve. Wear gloves (E186).

FOLLOW-ON MAINTENANCE:

None


29
28
30
34
31
32
33
20x17
D145-7714-SPA

END OF TASK

5-45 INSPECT HORIZONTAL HINGE PIN AND BEARINGS 5-45

INITIAL SETUP

Applicable Configurations:
All

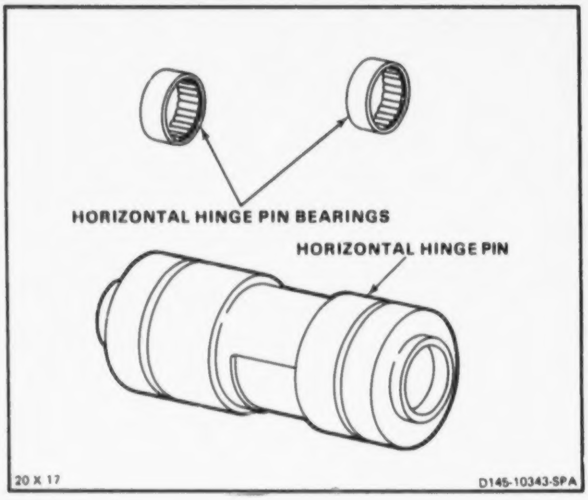
Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Drift, 1/8-Inch Diameter
Machinist's Scriber, 0.020 Inch Diameter Point

Materials:
Gloves (E186)

Personnel Required:
Aircraft Powertrain Repairer
Inspector

References:
TM 55-1520-240-23P
TM 43-0103

Equipment Condition:
Off Helicopter Task



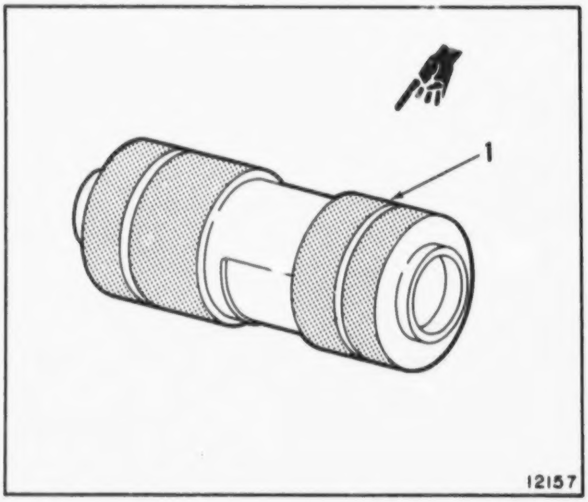
CAUTION

Do not touch parts with bare hands. Wear gloves (E186). Fingerprints can cause corrosion.

NOTE

Only horizontal hinge pins that have been shotpeened shall be installed. Shotpeened pins are identified by the letters SP following the serial number.

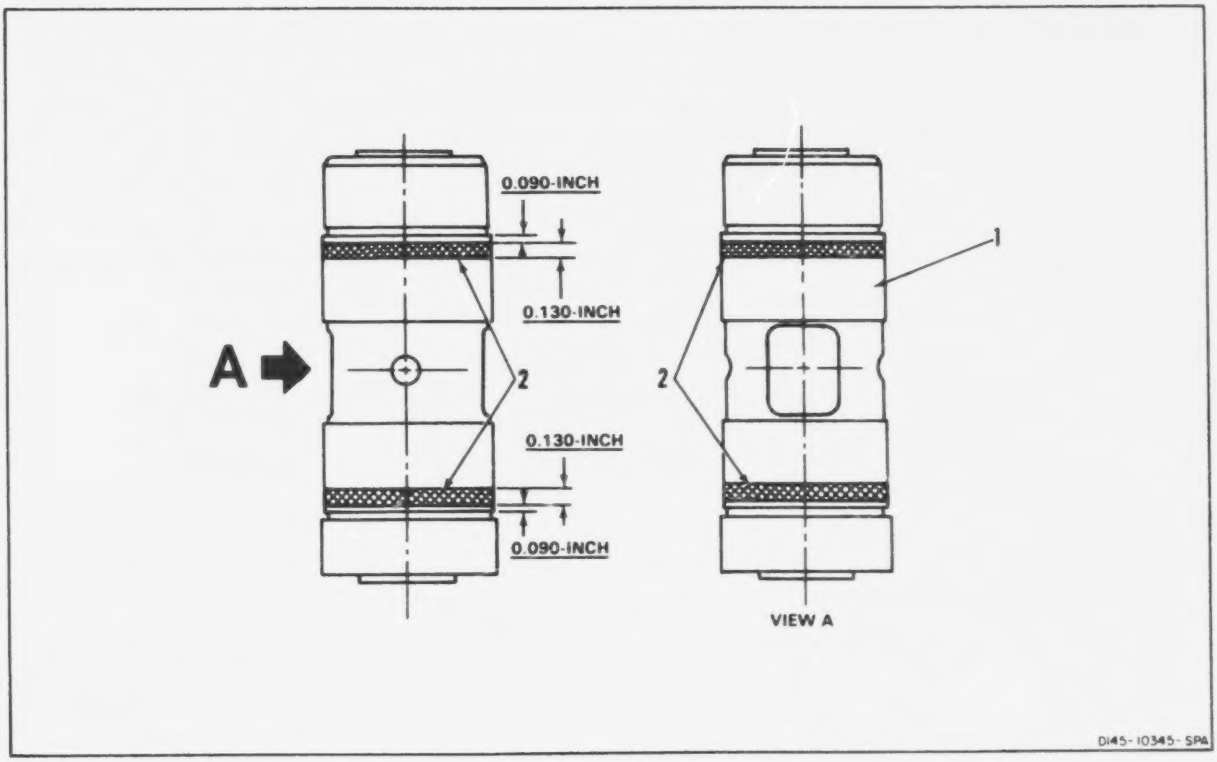
1. **Inspect shaded areas of horizontal hinge pin (1)** as follows:
   a. Check for rust or corrosion. There shall be no rust or corrosion.
   b. Check for stains. Stains shall be removable using solvent or light polishing.
   c. Check for grinding, honing, or polishing marks. Use scriber. Marks shall not be felt as scriber slides over them.



GO TO NEXT PAGE

5-45 INSPECT HORIZONTAL HINGE PIN AND BEARINGS (Continued) 5-45

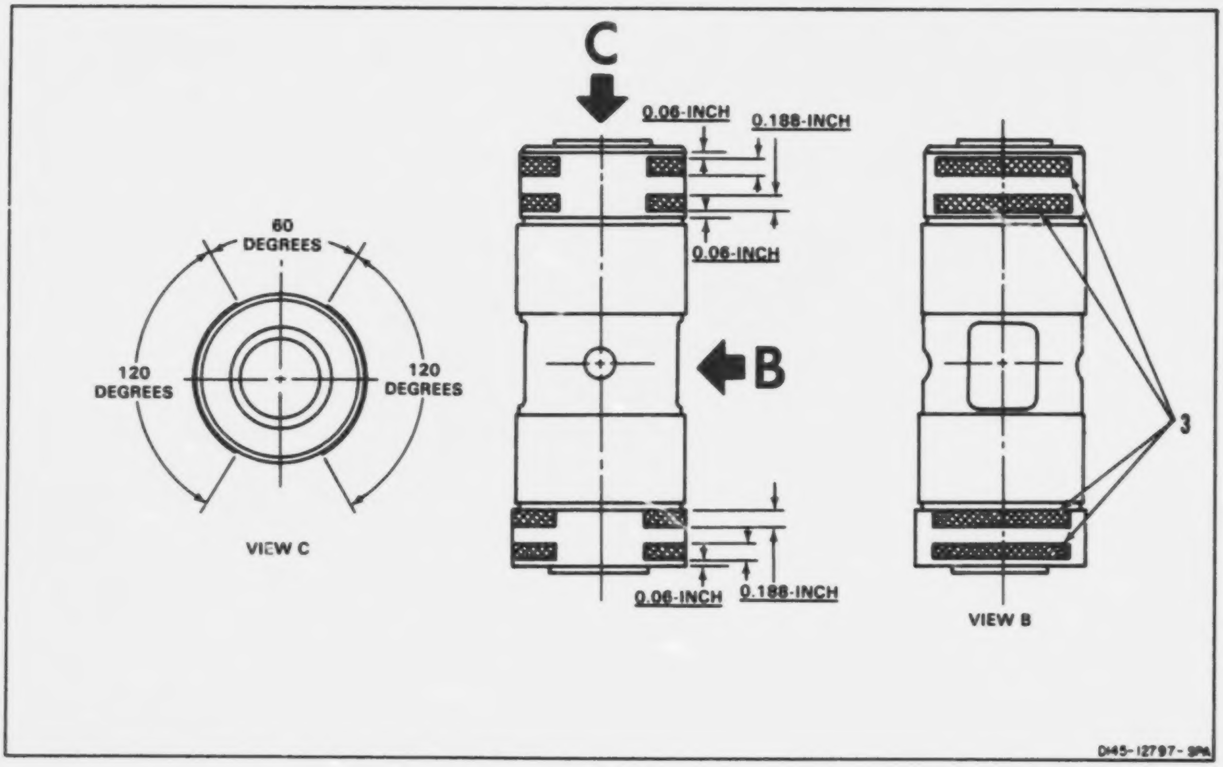
2. **Check critical chromium-plated areas (2) of horizontal hinge pin (1)** for pits, dents, nicks, scratches, scuffs, rust, or corrosion. Critical chromium-plated areas (2) shall have none of these defects.


0.090-INCH
0.130-INCH
A
2
0.130-INCH
0.090-INCH
1
2
VIEW A
D145-10345-SPA

GO TO NEXT PAGE

5-45 INSPECT HORIZONTAL HINGE PIN AND BEARINGS (Continued) 5-45

3. **Check critical carburized areas (3)** of horizontal hinge pin (1) for pits, dents, nicks, scratches, scuffs, rust, or corrosion. Critical carburized areas (3) shall have none of these defects.
4. Fluorescent inspect entire carburized areas of pin (1) (TM 43-0103). Replace any pin with cracks.
5. **Inspect all areas of pin (1), except critical areas** (steps 2 and 3) as follows:
   a. Check for pits. Pits shall not be greater than 0.030-inch wide, or 0.030-inch deep. There shall be no more than three pits in a 0.25-inch circle.
   b. Check for dents or nicks. Dents or nicks shall not be more than 0.060-inch wide nor 0.010-inch deep.
   c. Check for scratches or scuffs. Scratches or scuffs in direction around pin (1) shall not be more than 0.50-inch long. Scratches or scuffs in direction of length of pin shall not be more than 1.0 inch long. Scratches may not be more than 0.003-inch deep, nor 0.006-inch wide.


C
0.06-INCH
0.188-INCH
0.06-INCH
60 DEGREES
120 DEGREES
120 DEGREES
B
3
VIEW C
0.06-INCH
0.188-INCH
VIEW B
DH5-12797-SPA

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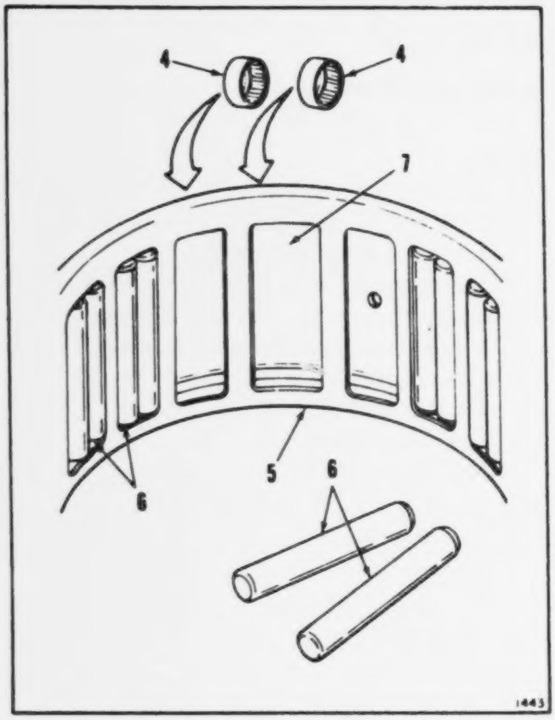
5-45 INSPECT HORIZONTAL HINGE PIN AND BEARINGS (Continued) 5-45



NOTE

A worn cage which permits rollers to be loose or fall out is not cause for bearing rejection.

5. **Inspect bearings (4)** as follows:

   a. Check bearings (4). There shall be no cracks, steel debris, spalling, damage or corrosion.

   NOTE

   Nicks, scratches, pitting, and discoloration on non-working surfaces are allowed. Fine copper or steel residue from the thrust washer is considered normal.

   b. Check that bearings (4) turn freely without roughness.

   c. Check for damaged cages (5). These are not permitted.

   d. Tap out several rollers (6). Use drift through oil hole in bearing (4).

   e. Check for smearing, indentations, or corrosion in raceways (7) or on rollers (6). These are not permitted.

   f. Check for flaked or spalled load-carrying surfaces. These are not permitted.

   g. Replace rollers (6).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-46 INSTALL HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING, AND PIN BEARINGS 5-46

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Bearing and Seal Pusher (T6)
Torque Wrench, 0 to 600 Inch-Pounds
Torque Wrench, 5 to 50 Inch-Pounds
Bolt, 3/8-Inch x 24 Thread x 5-Inches
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Electric Heat Gun
Kevlar Gloves (E187)

Materials:

Solvent (E162)
Cloth (E120)
Lubricating Oil (E254)
Lockwire (E231)
Grease (E190)
Antiseize Compound (E75)
Gloves (E186)
Temperature Indicating Strips (E413)
Adhesive (E63.1)

Parts:

Packings

Personnel Required:

Aircraft Powertrain Repairer (2)
Inspector

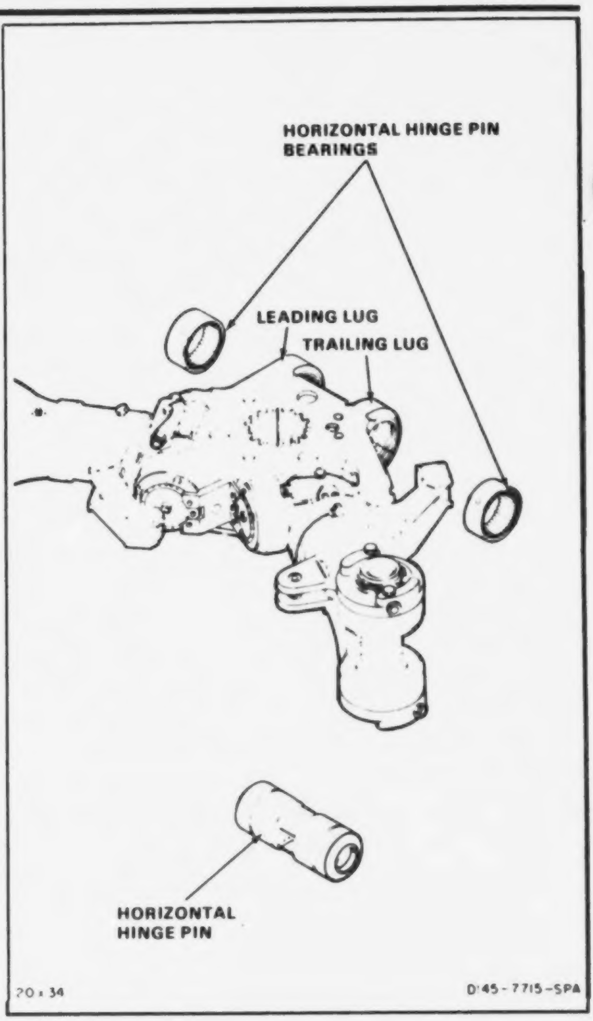
References:

TM 55-1520-240-23P

General Safety Instructions:

WARNING

Oil (E254) is a skin irritant. If oil gets on skin, wash thoroughly. If oil soaks into clothes, change clothes immediately. Oil gives off fumes that can cause injury to personnel. Use in a well-ventilated area.

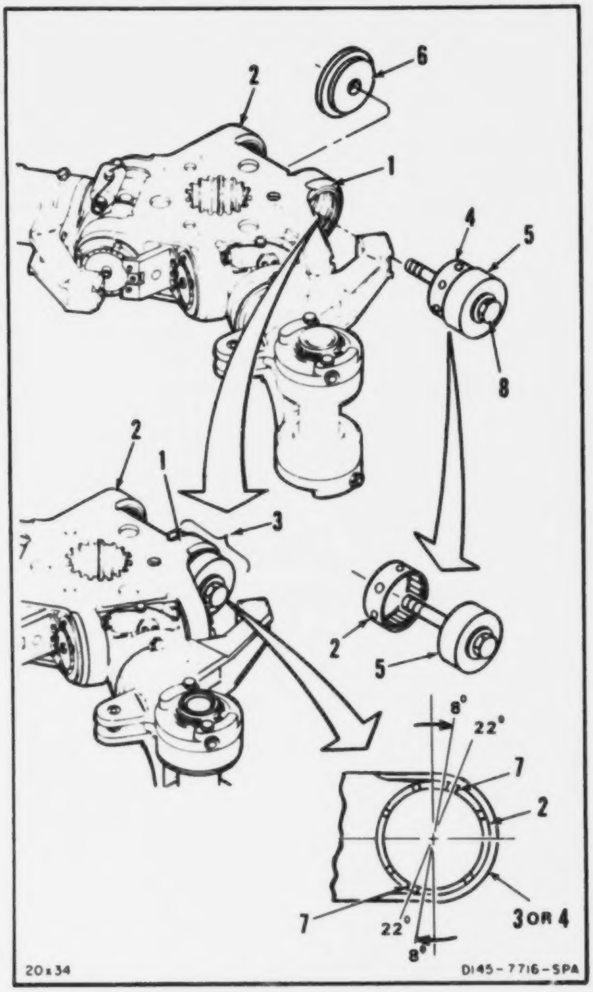


GO TO NEXT PAGE

5-46 INSTALL HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING, AND PIN BEARINGS (Continued) 5-46

NOTE

Procedure is similar to install any horizontal hinge pin, pitch-varying housing, and bearing assembly. There are three horizontal hinge pins, six pin bearings, and three pitch-varying housings on a rotary-wing head. Forward head is shown here.



INSTALL HORIZONTAL HINGE PIN BEARINGS

1. **Heat lugs (1 and 2) to 250°F (121°C).** Use heat gun. Monitor temperature. Use temperature indicating strips (E413). Wear gloves (E187).
2. **Install bearing and seal pusher (T6) (3)** as follows:

NOTE

Correct bearing must be installed in lug. Leading lug bearing is wider and has smaller inside diameter. Bearing markings must be next to threads on lug after installation.

a. Coat bearing (4) and inside of lug (1 or 2). Use lubricating oil (E254).

b. Position identification side of bearing (2) against bearing installation pilot (5).

NOTE

If bearing is new, without matchmarks, go to step d.

c. Position bearing installation pilot (5) so bearing (2) is against outboard, threaded side of lug (3 or 4). Align matchmarks on bearing with matchmarks on lug unless bearing is to be rotated for longer service.

d. Align bearing (2) without matchmarks so highest and lowest holes (7) are rotated 8 to 22 degrees clockwise from vertical.

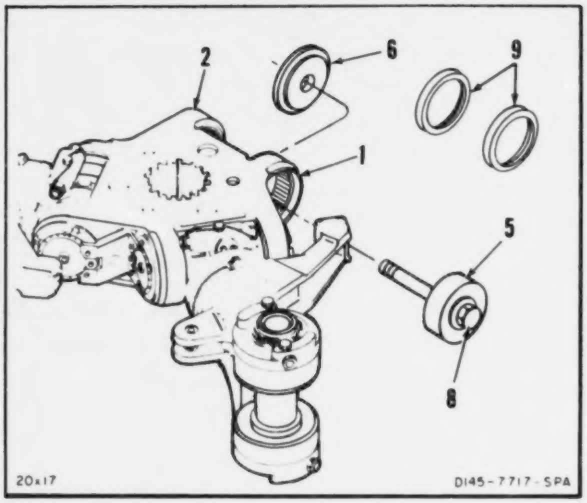
e. Install bearing and seal pilot (6) with wider-diameter bearing side toward lug.

f. Tighten bolt (8) to install bearing (2).

GO TO NEXT PAGE

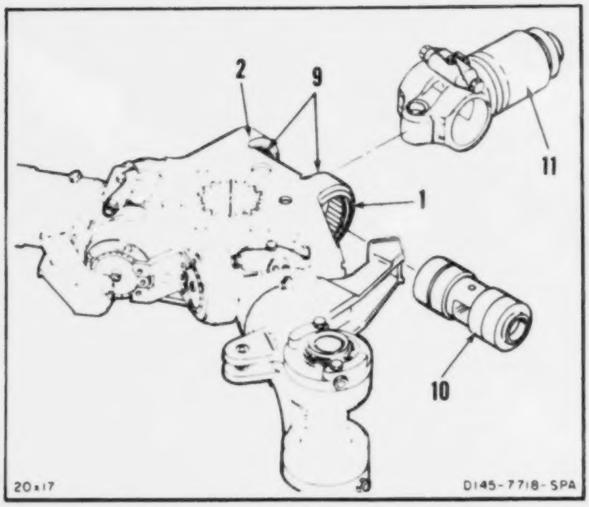
5-46 INSTALL HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING, AND PIN BEARINGS (Continued) 5-46

3. **Remove bolt (8), bearing installation pilot (5), and seal and bearing pilot (6)** from lug (1 or 2).
4. Follow steps 1 and 2 for other lug (1 or 2).
5. Wait until lugs (1 or 2) cool to 150°F (66°C). Install seals (9) (Task 5-43).

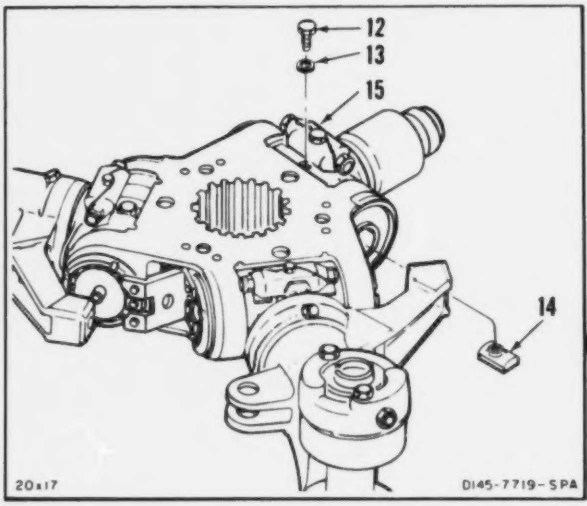


INSTALL PITCH-VARYING SHAFT AND HORIZONTAL HINGE PIN

6. Pack lips of seals (9). Use grease (E190).
7. **Coat outside of horizontal hinge pin (10).** Use oil (E254). Wear gloves (E186).
8. Position pitch-varying shaft (11) between lugs (1 and 2). Insert chamfered end of pin (10) into trailing lug (1).
9. **Align matchmarks on pin (10)** with lugs (1 and 2). Push pin into lugs by hand. Wear gloves (E186).



10. **Install shoulder bolt (12), washer (13), and special nut (14). Torque bolt to 425 inch-pounds.**
11. Lockwire bolt (12) to pitch-varying oil tank (15).



GO TO NEXT PAGE

5-46 INSTALL HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING, AND PIN BEARINGS (Continued) 5-46

INSTALL PITCH-VARYING HOUSING

CAUTION

Do not apply excess grease (E190) to oil seals. Oil passages can be clogged.

12. Pack space between lips of seal (16). Use grease (E190).
13. Check that bearing surfaces (17) and seal-running surfaces (18) are clean. Coat remaining surfaces. Use lubricating oil (E254).

WARNING

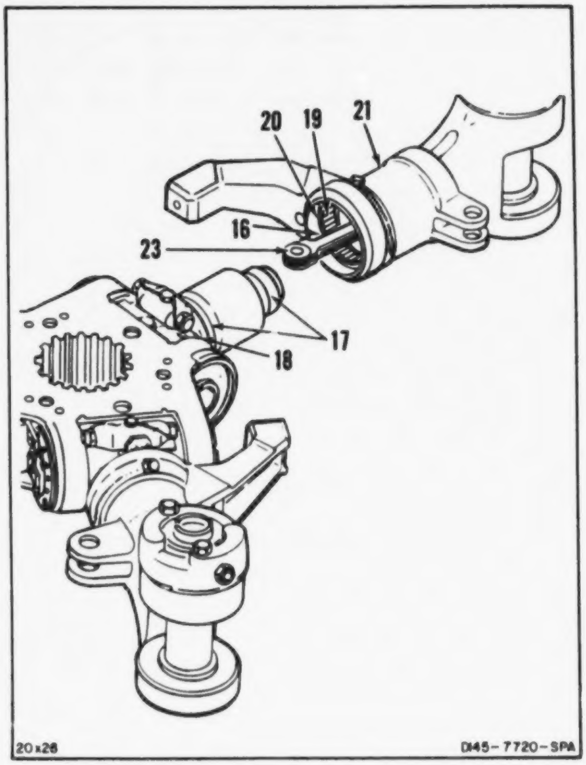
Solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Get medical attention for eyes.

14. Check that bearing rollers (19) are in cage (20). Clean and position rollers, if needed. Use cloth (E120) damp with solvent (E162). Apply grease (E190) to prevent rollers from falling. Use gloves (E186).

CAUTION

Do not fold or damage seals during pitch housing installation. Oil leakage can occur if seal is damaged.

15. Install housing (21) and align.



GO TO NEXT PAGE

5-46 INSTALL HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING, AND PIN BEARINGS (Continued) 5-46

WARNING

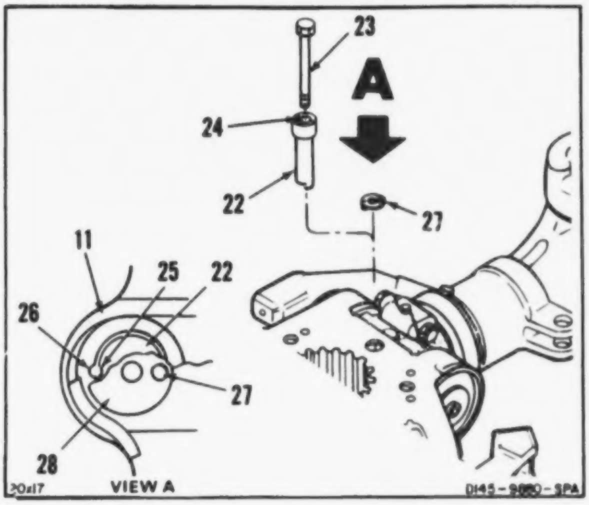
Antiseize compound (E75) can form toxic vapors if exposed to flame. Use in well-ventilated area, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

16. Coat tie bar pin (22). Use antiseize compound (E75). Install pin on 3/8-inch x 24 thread x 5-inch bolt (23). Wear gloves (E186).

CAUTION

Do not misalign tie bar pin during installation. Rotary-wing head will be damaged at maximum flap angle. Nut plate at pitch shaft will also be damaged.

17. Align pin (22) so slot (24) in pin is aligned with slot (25) in pitch-varying shaft (11). Install pin. Remove bolt (23).
18. Position retaining washer pin (26) over slots (24 and 25). Install retaining washer (27).



GO TO NEXT PAGE

5-46 INSTALL HORIZONTAL HINGE PIN, PITCH-VARYING HOUSING, AND PIN BEARINGS (Continued) 5-46

CAUTION

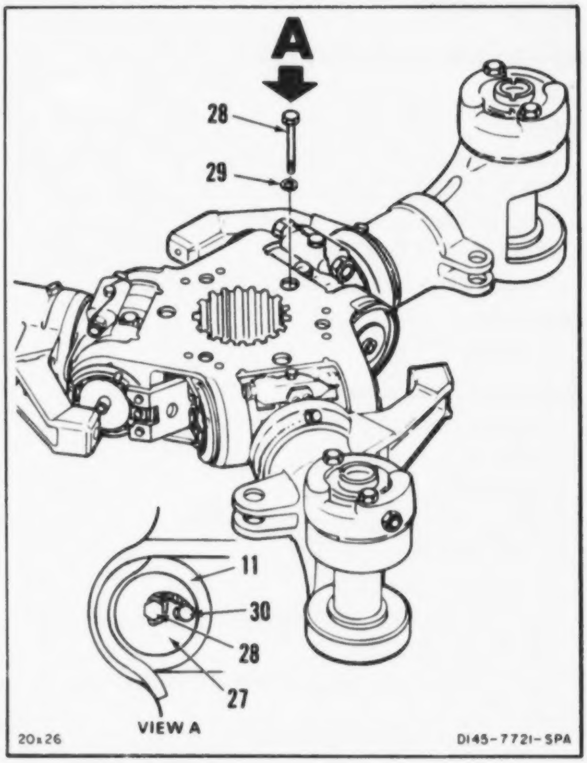
Do not use substitute bolt or washer. Damage to hub can result.

19. Install bolt (28) and washer (29). **Torque bolt to 40 inch-pounds.** Lockwire bolt to retaining washer pin (30).

WARNING

Adhesive (E63.1) can irritate skin and cause burns. Avoid contact with skin, eyes, and clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

20. Seal retaining washer (27) to shaft (11). Use adhesive (E63.1).



INSPECT

21. Coat packings (31) and grooves (32) of end seal plugs (33). Use lubricating oil (E254). Install plugs in horizontal hinge pin (10).
22. Check thickness of two thrust washers (34). Thickness may not be less than 0.115 inch.

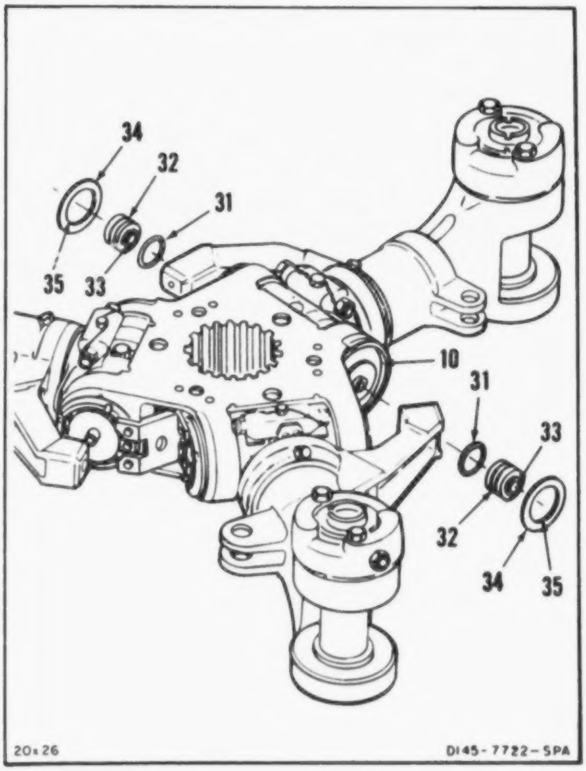
NOTE

Washers shall have at least four equally spaced radial grooves on each face. Washers with eight grooves on one face and four grooves on the opposite face are acceptable.

23. Position thrust washers (34) with inside diameter chamfer (35) toward pin (10).

FOLLOW-ON MAINTENANCE:

Install horizontal hinge pin caps (Task 5-41).



END OF TASK

5-47 INSPECT ROTOR HEAD FIXED DROOP STOPS 5-47

INITIAL SETUP

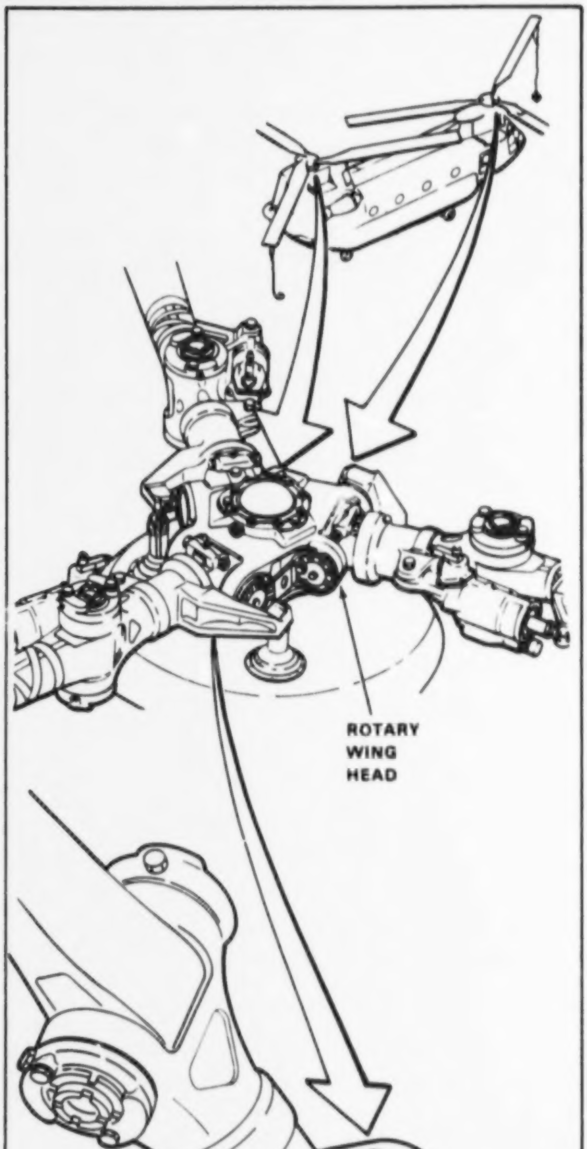
Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Torque Wrench, 30 to 150 Inch-Pounds

Materials:
Lockwire (E229)

Personnel Required:
Medium Helicopter Repairer (5)
Inspector

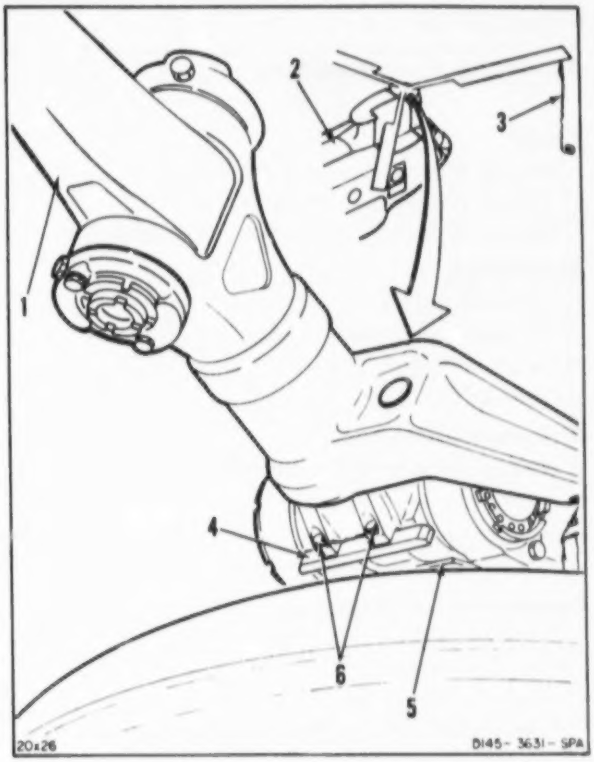
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line on One Forward and One Aft Blade (Task 1-26)
Pylon or Forward Work Platform Open (Task 2-2)
Aft Droop Stop Shroud Removed (Task 5-48.3)



5-47 INSPECT ROTOR HEAD FIXED DROOP STOPS (Continued) 5-47

NOTE

Procedure is same to inspect all six fixed droop stops. Forward fixed droop stop is shown here.



1. Turn rotor blades (1) until blade is centered over tunnel (2). Use two tiedown lines (3) to turn and tie down blades.

WARNING

Do not lower blades without warning. Injury to personnel can occur if blade is lowered while inspection is in progress.

2. Have helpers lift blade (1) until fixed droop stop (4) is clear of hub (5).
3. **Check fixed droop stop (4) for dents where droop stop contacts hub (5).** Dents shall not exceed 0.012 inch in depth.
4. **Remove lockwire from bolts (6). Torque bolts to 70 inch-pounds .**
5. Lockwire bolts (6). Use lockwire (E229).
6. Have helpers lower blade (1).

FOLLOW-ON MAINTENANCE:

Close work platform (Task 2-2).

END OF TASK

5-48 REPLACE FIXED DROOP STOP 5-48

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Torque Wrench, 30 to 150 Inch-Pounds

Materials:
Lockwire (E229)
Dry Cleaning Solvent (E162)
Gloves (E186)
Cloth (E120)

Personnel Required:
Medium Helicopter Repairer (5)
Inspector

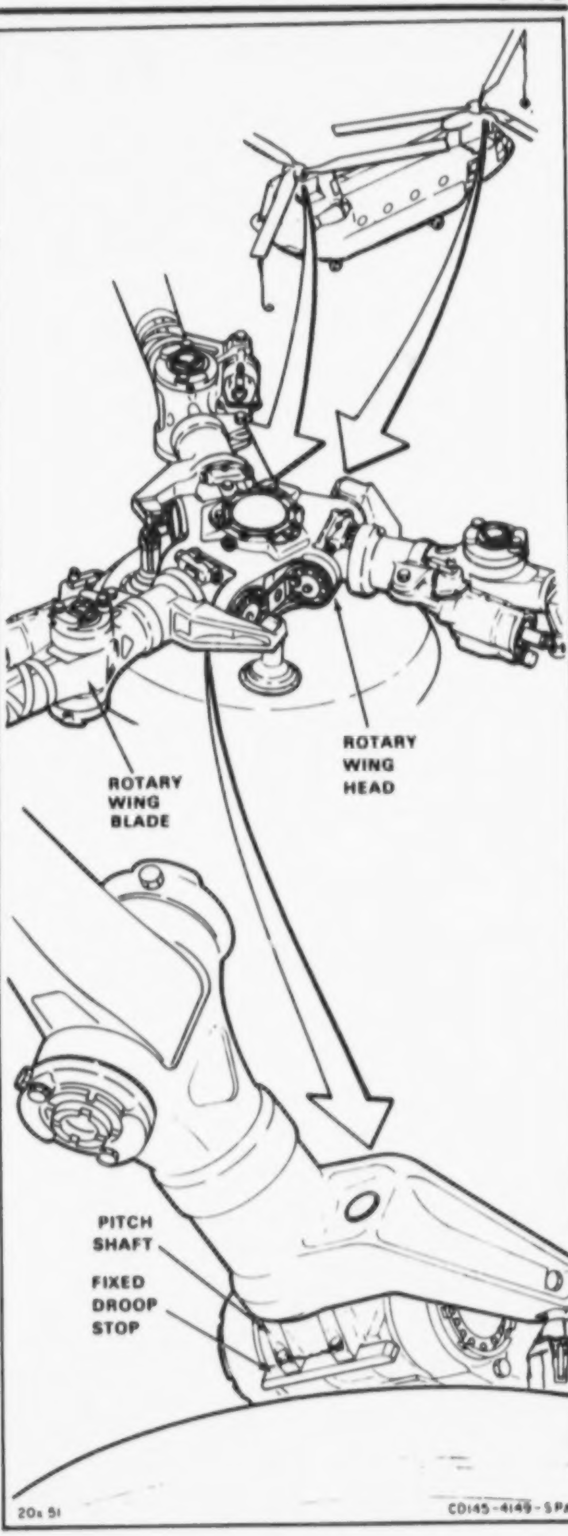
References:
TM 55-1520-240-23P

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)
Forward or Pylon Work Platform Open (Task 2-2)
Aft Droop Stop Shroud Removed (Task 5-48.3)

General Safety Instructions:

WARNING

Do not lower blade suddenly. Personnel can be injured if blade is lowered suddenly while droop stop work is in progress.



GO TO NEXT PAGE

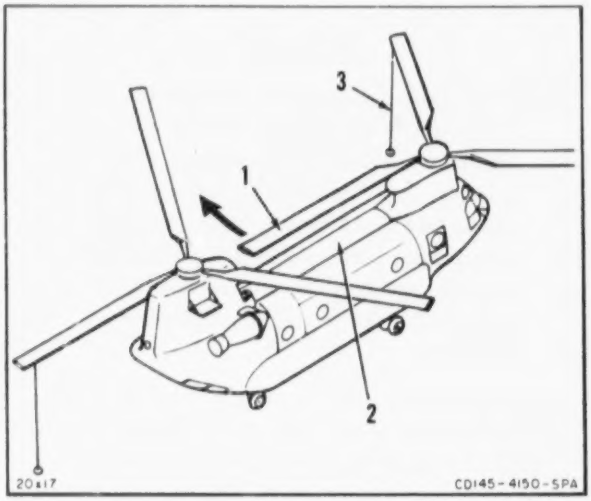
CAUTION

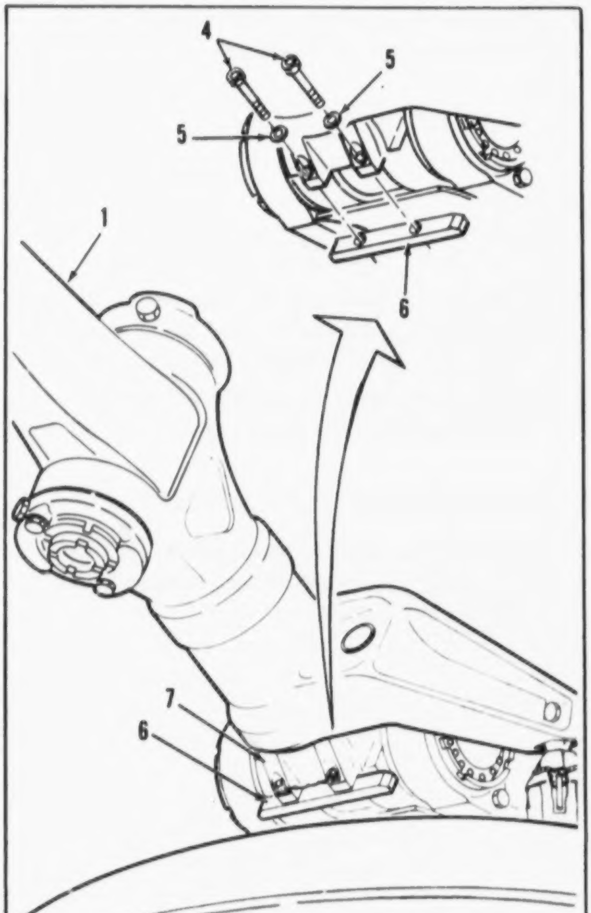
Forward and aft fixed droop stops are not interchangeable. Helicopter can be damaged if droop stop is installed on wrong head.

NOTE

Replacement procedure is similar for forward or aft fixed droop stops. Differences are noted in steps. Replacement of droop stop on forward rotary wing head is shown here.

1. Center blade (1) over fuselage (2). Use tie-down line (3). Tie down one forward and one aft blade.
2. Remove lockwire from two bolts (4). Remove bolts and washers (5). **Hold droop stop (6).**
3. Have helpers lift and support blade (1).
4. **Remove droop stop (6)** from pitch shaft (7).
5. Have helpers lower blade (1).



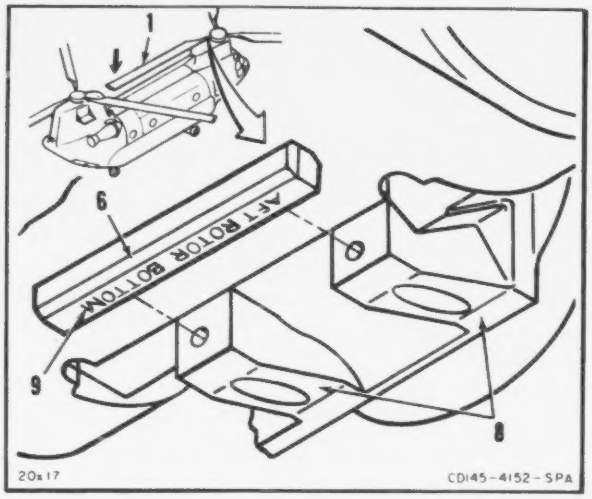


GO TO NEXT PAGE

5-48 REPLACE FIXED DROOP STOP (Continued) 5-48

WARNING

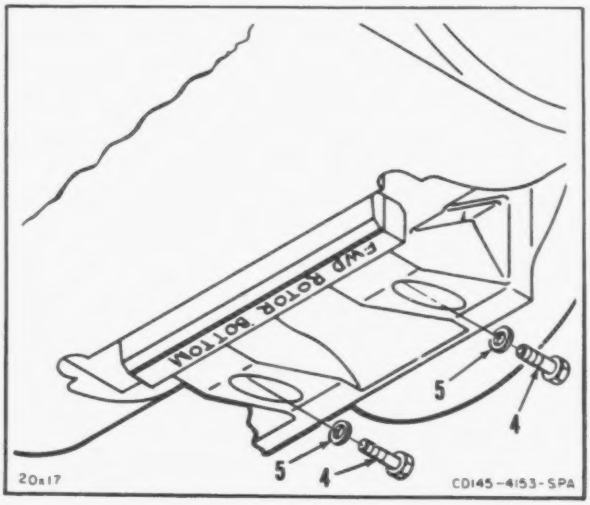
Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



6. Clean droop stop (6) and lugs (8). Use cloth (E120) damp with dry cleaning solvent (E162). Use goggles and gloves (E186).
7. Have helpers lift and support blade (1).
8. **Position droop stop (6)** on lugs (8) with BOTTOM marking (9) down.

WARNING

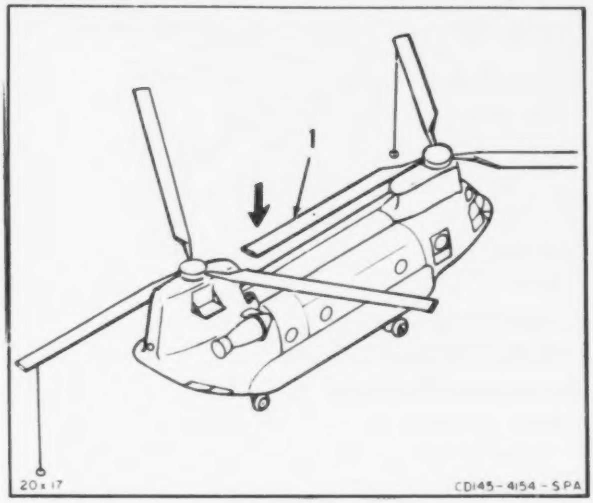
Always install droop stop with new bolts. Overstressed bolts can cause loss of droop stop with possible injury to personnel and damage to helicopter.



9. Install washers (5) and new bolts (4).
10. **On aft rotor, torque bolts (4) to 70 inch-pounds. On forward rotor, torque bolts to 70 inch-pounds.**

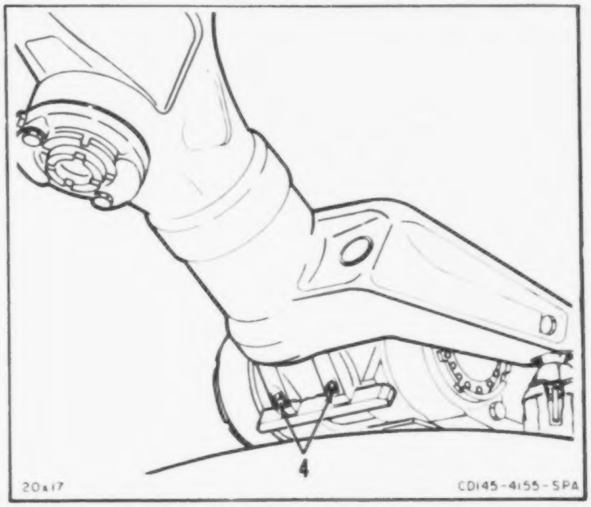
GO TO NEXT PAGE

11. Have helpers lower blade (1).


1
20x17
CD145-4154-SPA

12. Lockwire two bolts (4). Use lockwire (E229).

INSPECT


4
20x17
CD145-4155-SPA

FOLLOW-ON MAINTENANCE:

Install aft droop stop shroud (Task 5-48.5)

Close work platform (Task 2-2).

END OF TASK

5-48.1 REMOVE DROOP STOP SHROUD SHIELD 5-48.1

INITIAL SETUP

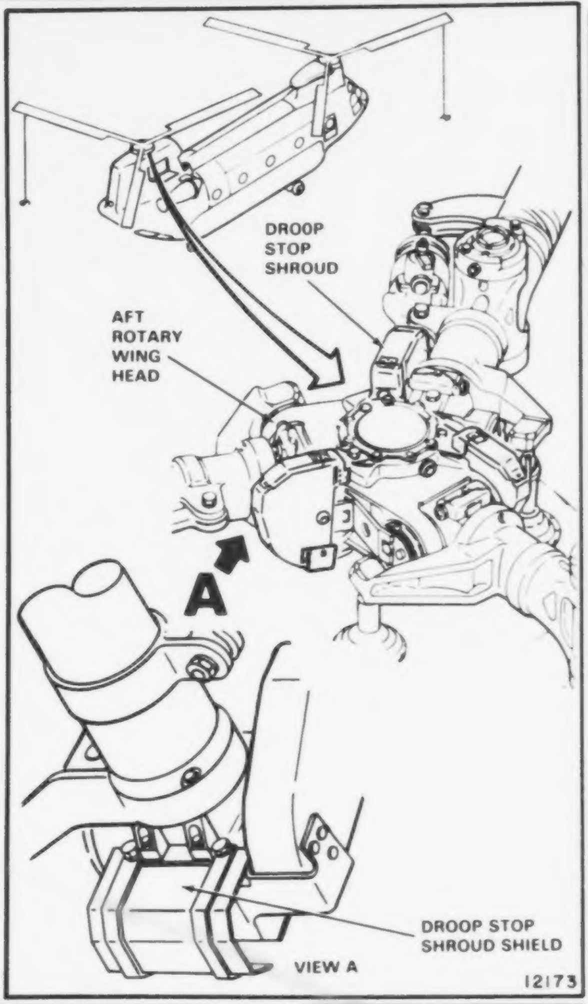
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692

Materials:
None

Personnel Required:
Medium Helicopter Repairer

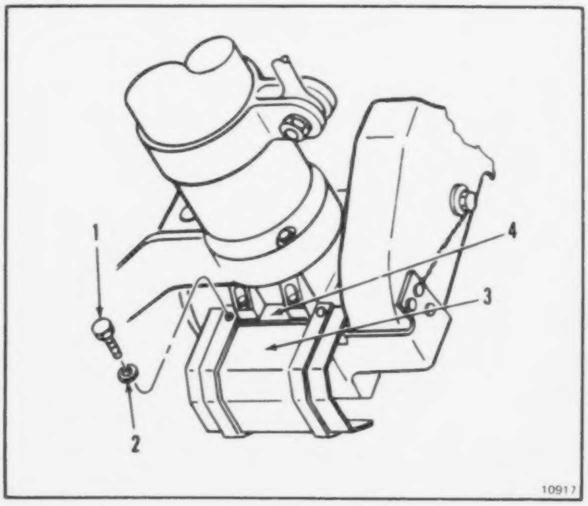
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)
Aft Pylon Work Platform Open (Task 2-2)


DROOP STOP SHROUD
AFT ROTARY WING HEAD
A
DROOP STOP SHROUD SHIELD
VIEW A
12173

NOTE

There are three droop stop shroud shields. Procedure is same to remove any droop stop shroud shield.

1. Remove lockwire. Remove two bolts (1) and washers (2).
2. **Remove shield (3)** from droop stop (4).



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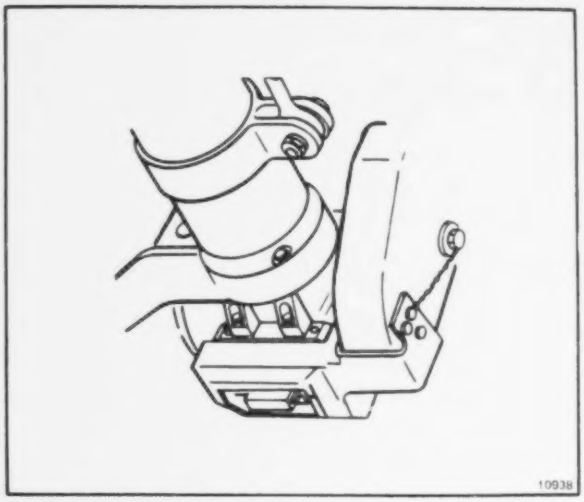
5-48.1 REMOVE DROOP STOP SHROUD SHIELD (Continued) 5-48.1

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-48.2 REMOVE DROOP STOP SHROUD BASE 5-48.2

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692

Materials:

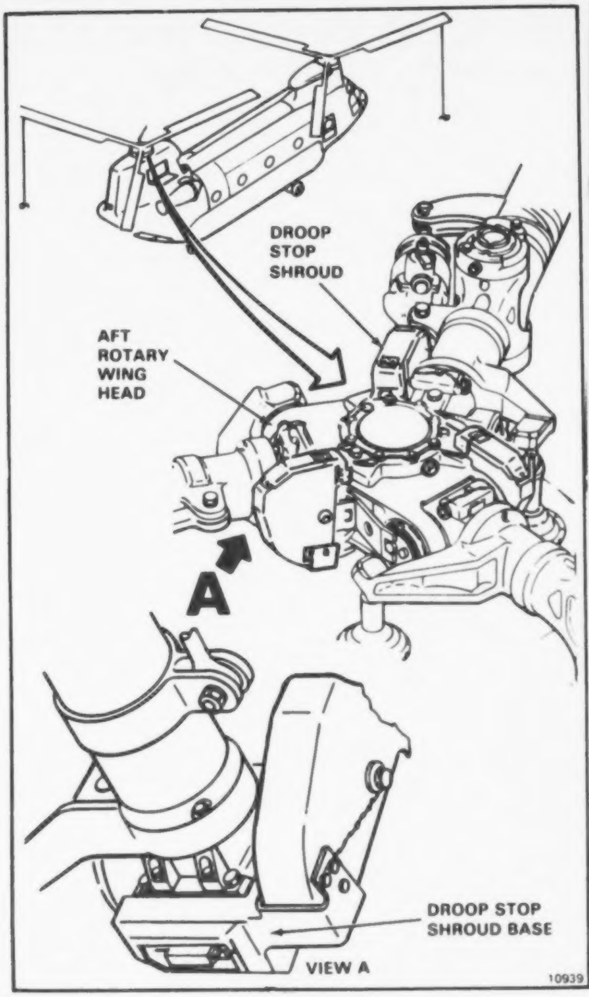
None

Personnel Required:

Medium Helicopter Repairer

Equipment Condition:

Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Aft Work Platform Open (Task 2-2)
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)
Droop Stop Shroud Shield Removed (Task 5-48.1)


DROOP
STOP
SHROUD
AFT
ROTARY
WING
HEAD
A
DROOP STOP
SHROUD BASE
VIEW A
10939

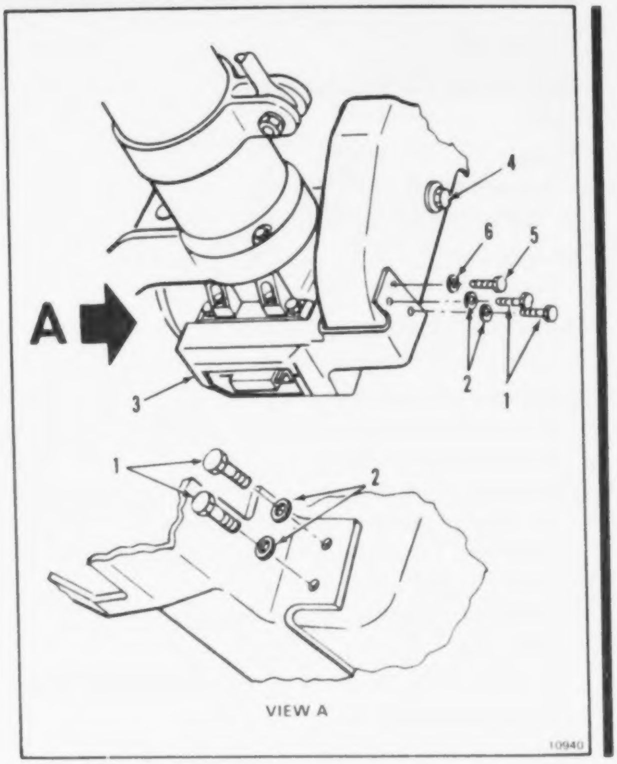
GO TO NEXT PAGE

5-48.2 REMOVE DROOP STOP SHROUD BASE (Continued) 5-48.2

NOTE

There are three droop stop shroud bases. Procedure is same to remove any base.

1. **Remove four bolts (1) and washers (2)** from shroud base (3).
2. Remove lockwire from bolts (4 and 5). **Remove bolt (5)** and washer (6).


4
6
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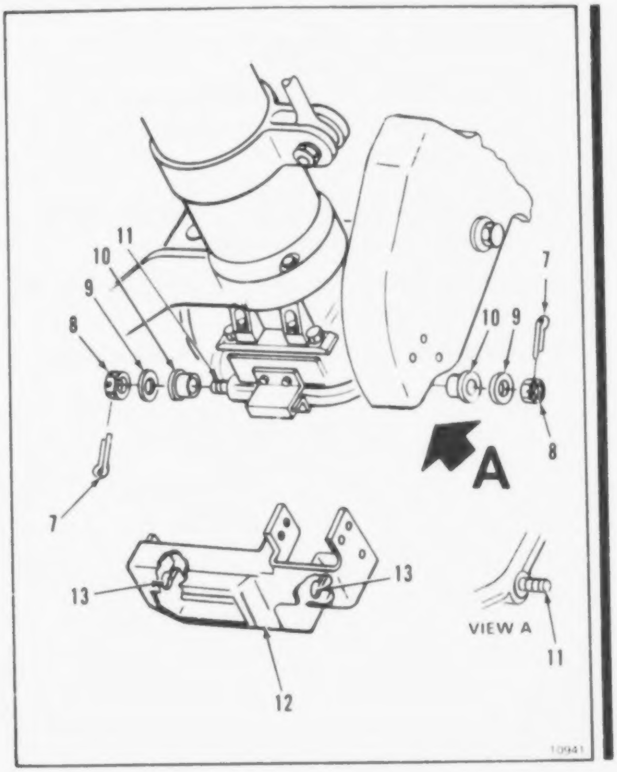
VIEW A
10940

3. **Remove** two cotter pins (7), **nuts (8)** washers (9), and bushings (10) from shaft (11).
4. **Slide droop stop shroud base (12) from shaft (11)** through slots (13). Remove base.

FOLLOW-ON MAINTENANCE:

None


11
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VIEW A
11
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10941

END OF TASK

5-48.3 REMOVE DROOP STOP SHROUD 5-48.3

INITIAL SETUP

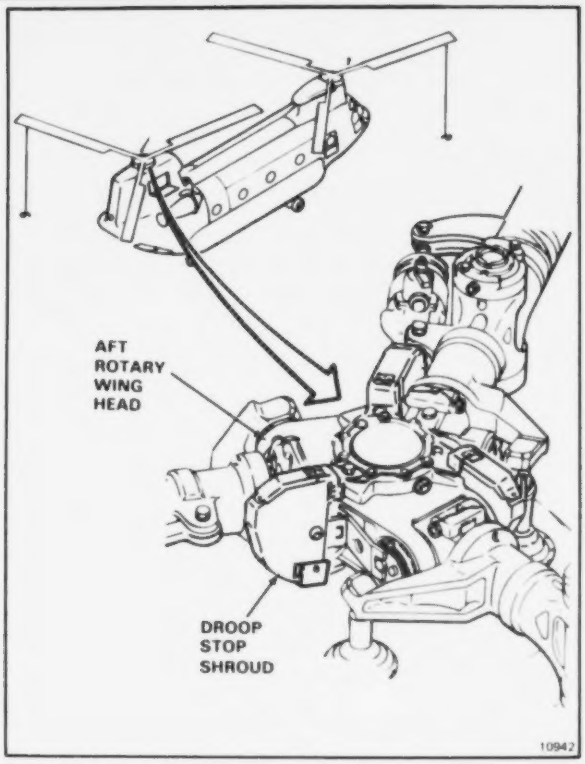
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Materials:
None

Personnel Required:
Medium Helicopter Repairer

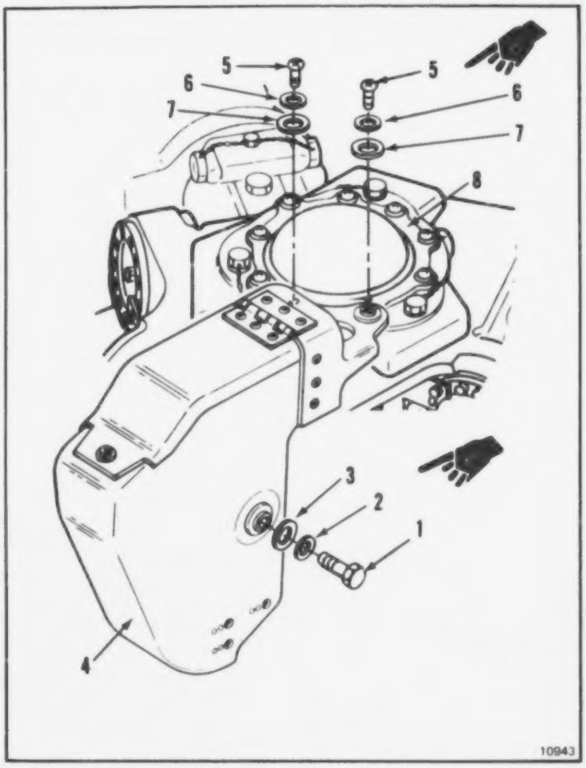
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Aft Work Platform Open (Task 2-2)
Tiedown Line on One Forward and One Aft Blade (Task 1-26)
Droop Stop Shroud Shield Removed (Task 5-48.1)
Drop Stop Shroud Base Removed (Task 5-48.2)



NOTE

There are three drop stop shrouds. Procedure is same to remove any shroud.

1. **Remove bolt (1)** and washers (2) and (3) from droop stop shroud (4).
2. **Remove two screws (5)** and washers (6) and (7) from shroud (4).
3. **Remove shroud (4)** from rotor head (8).



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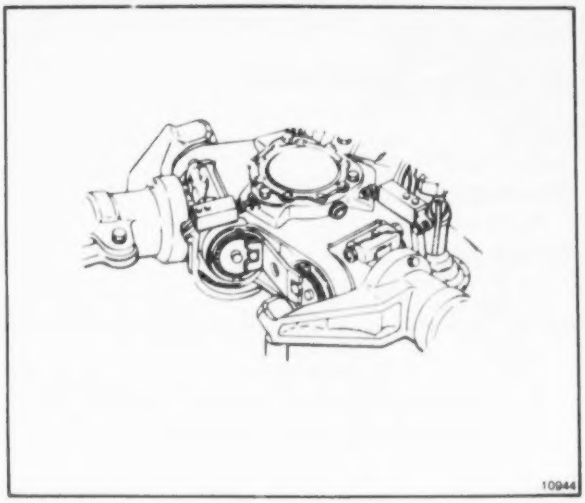
5-48.3 REMOVE DROOP STOP SHROUD (Continued) 5-48.3

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-48.4 REPAIR DROOP STOP SHROUD, BASE, OR SHIELD 5-48.4

INITIAL SETUP

Applicable Configurations:
All

Tools:
As Required

Materials:
As Required

Personnel Required:
Aircraft Structural Repairer
Inspector

References:
TM 55-1520-240-23P
TM 55-1500-204-25/1
Task 2-325
Task 2-326

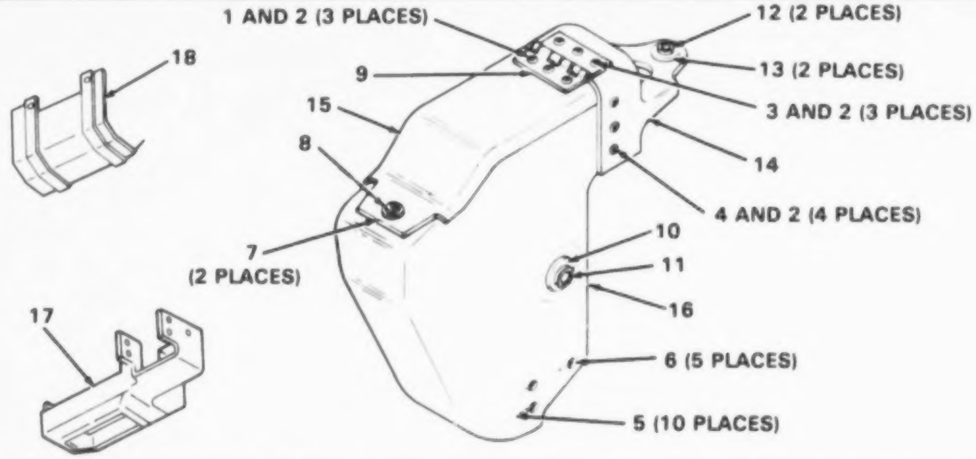
Equipment Condition:
As Required

General Safety Instructions:
As Required

NOTE

Procedure is same to repair droop stop shroud, base, or shield.

Three droop stop shrouds are located on the aft rotor head. They are manufactured from 10 ply BMS 8-79 glass fabric, pre-pregnated type 1581 or 7781.



INDEX NO.	NOMENCLATURE	ORIGINAL MATERIAL	REPAIR MATERIAL	REPAIR TASK
1	RIVET	M7885-2-5-4	☞	2-326 AND NOTE B.
2	WASHER	MS27183-6		2-326 AND NOTE B.
3	RIVET	M885-2-5-7		2-326 AND NOTE B.
4	RIVET	M885-2-5-5		2-326 AND NOTE B.
5	RIVET	MS20426A3		2-326 AND NOTE B.
6	NUTPLATE	MS21071-4		NOTE B.
7	RIVET	M7885-3-4-4		2-326 AND NOTE B.
8	RECEPTACLE	BACR11X3		NOTE B.
9	HINGE	MS20001CH6		2-325 AND NOTE B.
10	GROMMET	MS35489-43		—
11	BUSHING	145R3132-1		—
12	BUSHING	145R3132-2		—
13	GROMMET	MS35489-38		—
14	CAP	NOTE C.	NOTE A.	NOTE B.
15	COVER	NOTE C.	NOTE A.	NOTE B.
16	SHROUD	NOTE C.	NOTE A.	NOTE B.
17	BASE	NOTE C.	NOTE A.	NOTE B.
18	SHIELD	NOTE C.	NOTE A.	NOTE B.

NOTES: A. USE GLASS CLOTH (E130)
B. REFER TO TM 55-1500-204-25/1
C. 10 PLY BMS8-79 GLASS FABRIC, PRE-PREGNATED TYPE 1581 OR 7781

10945

FOLLOW-ON MAINTENANCE:

Refinish (Task 2-353).

END OF TASK

5-48.5 INSTALL DROOP STOP SHROUD 5-48.5

INITIAL SETUP

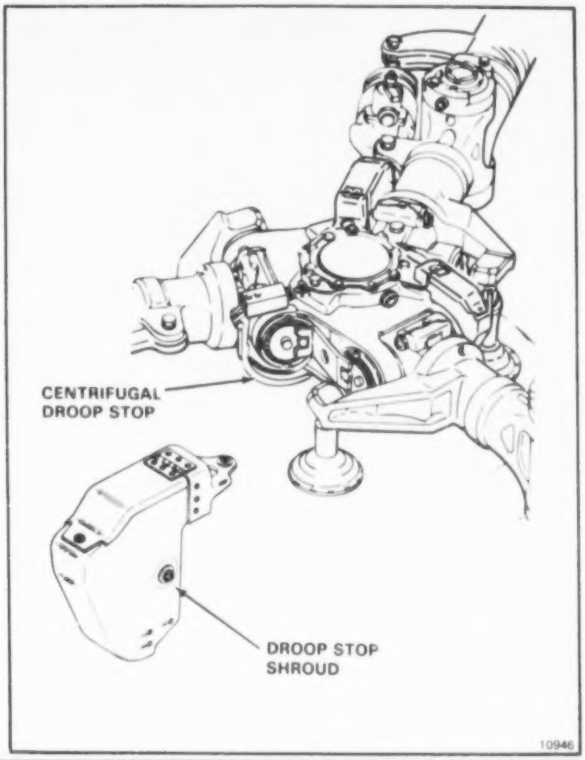
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Torque Wrench, 0 to 150 Inch-Pounds

Materials:
None

Personnel Required:
Medium Helicopter Repairer
Inspector

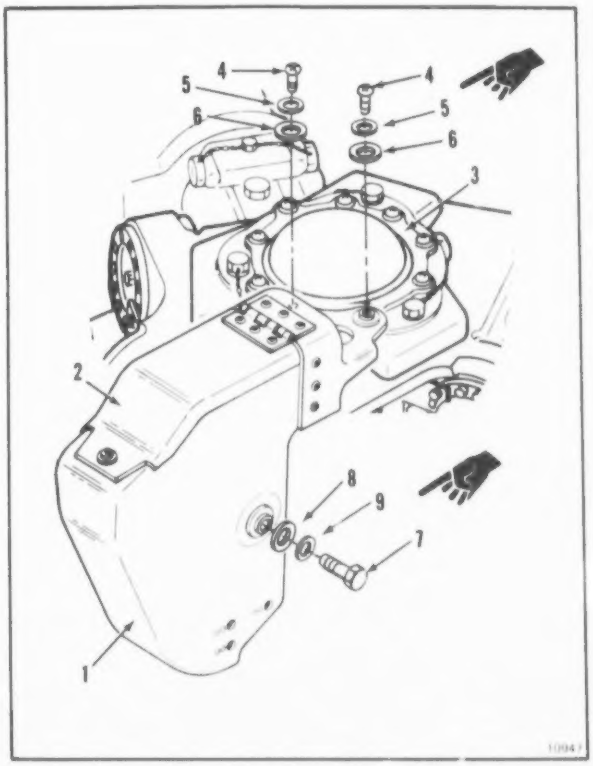
References:
TM 55-1520-240-23P


CENTRIFUGAL DROOP STOP
DROOP STOP SHROUD
10946

NOTE

There are three droop stop shrouds. Procedure is same to install any shroud.

1. **Position droop stop shroud (1),** hinged cover (2) up, **on rotor head (3).**
2. **Install screws (4)** and washers (5) and (6) in shroud (1). **Torque screws to 22 inch-pounds.**
3. **Install bolt (7)** and washers (8) and (9) in shroud (1). **Torque bolt to 110 inch-pounds.**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GO TO NEXT PAGE

5-48.5 INSTALL DROOP STOP SHROUD (Continued) 5-48.5

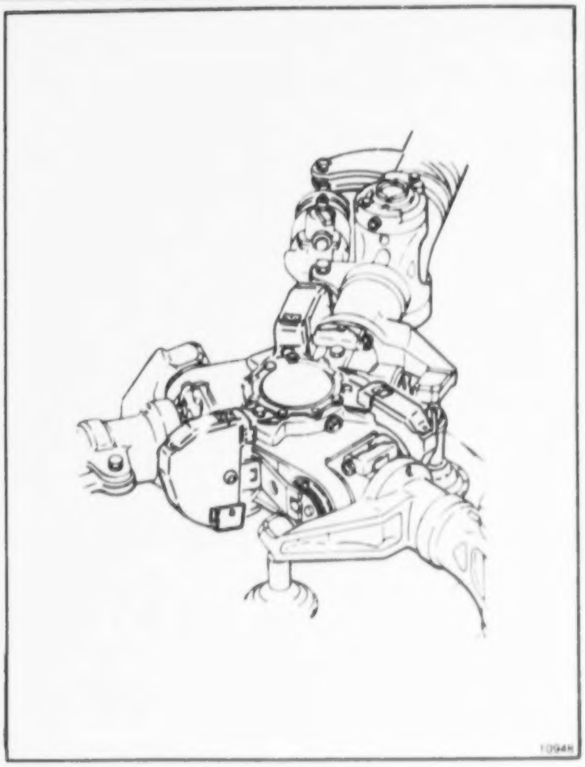
FOLLOW-ON MAINTENANCE:

Install droop stop shroud base (Task 5-48.6).

Install droop stop shroud shield (Task 5-48.7).

Close aft work platforms (Task 2-2).

Remove tiedown lines from blades.



END OF TASK

5-48.6 INSTALL DROOP STOP SHROUD BASE 5-48.6

INITIAL SETUP

Applicable Configurations:
All

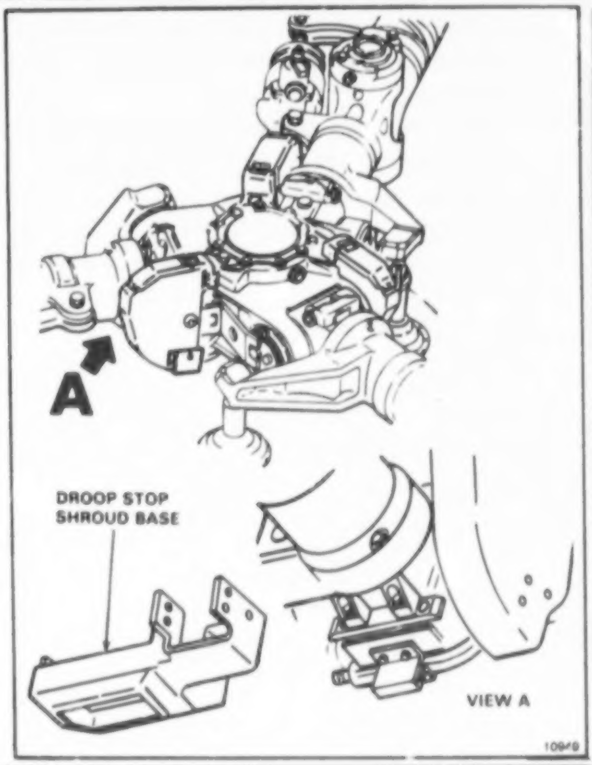
Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Torque Wrench, 5 to 150 Inch-Pounds

Materials:
Lockwire (E231)

Parts:
Cotter Pins

Personnel Required:
Medium Helicopter Repairer
Inspector

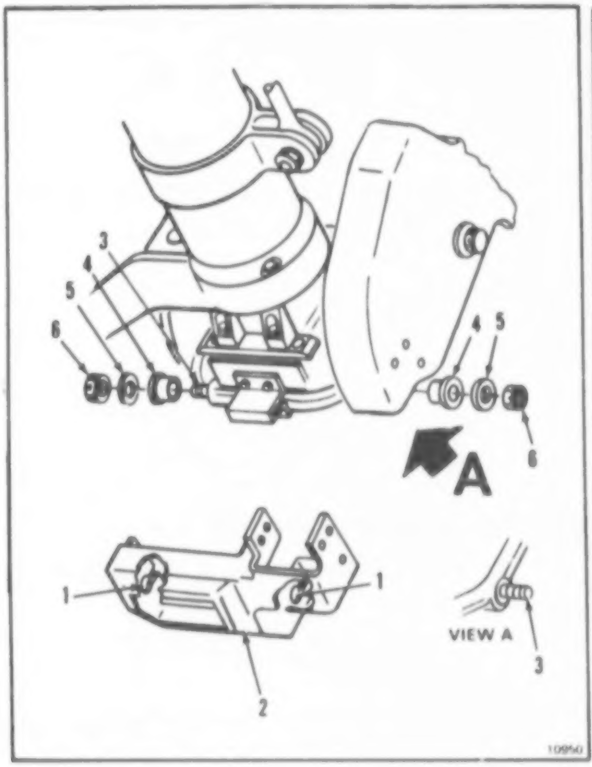
References:
TM 55-1520-240-23P



NOTE

There are three droop stop shroud bases. Procedure is same to install any base.

1. Align slots (1) of droop stop shroud base (2) with shaft (3). **Slide base on shaft.**
2. **Install bushings (4)**, flange outboard, on shaft (3).
3. **Install washers (5) and nuts (6)**. Do not tighten nuts at this time.



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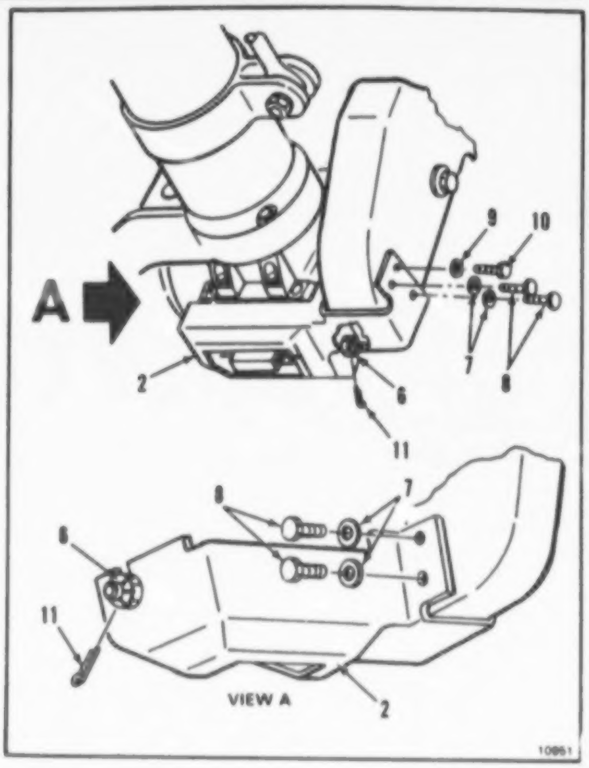
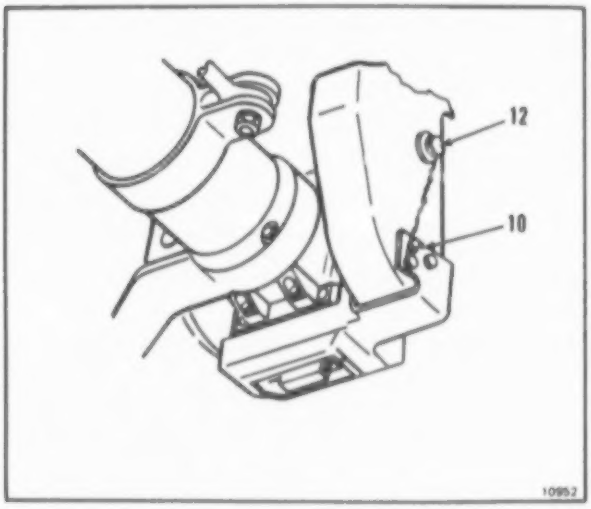
5-48.6 INSTALL DROOP STOP SHROUD BASE (Continued) 5-48.6

4. **Install four washers (7) and bolts (8)** in base (2). **Torque bolts to 70 inch-pounds** .
5. **Install washer (9) and bolt (10)** in base (2). **Torque bolt to 70 inch-pounds** .
6. **Tighten two nuts (6)** until rubber of bushings (4) is compressed 0.010 to 0.030 inch and cotter pin (11) holes are aligned with nut slots. Use addditional washers (5) if required. Install cotter pins.



7. **Install lockwire between bolts (10 and 12).** Use lockwire (E231).



FOLLOW-ON MAINTENANCE:

Install droop stop shroud shield (Task 5-48.7).

END OF TASK

5-48.7 INSTALL DROOP STOP SHROUD SHIELD 5-48.7

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Torque Wrench, 5 to 50 Inch-Pounds

Materials:

Lockwire (E231)

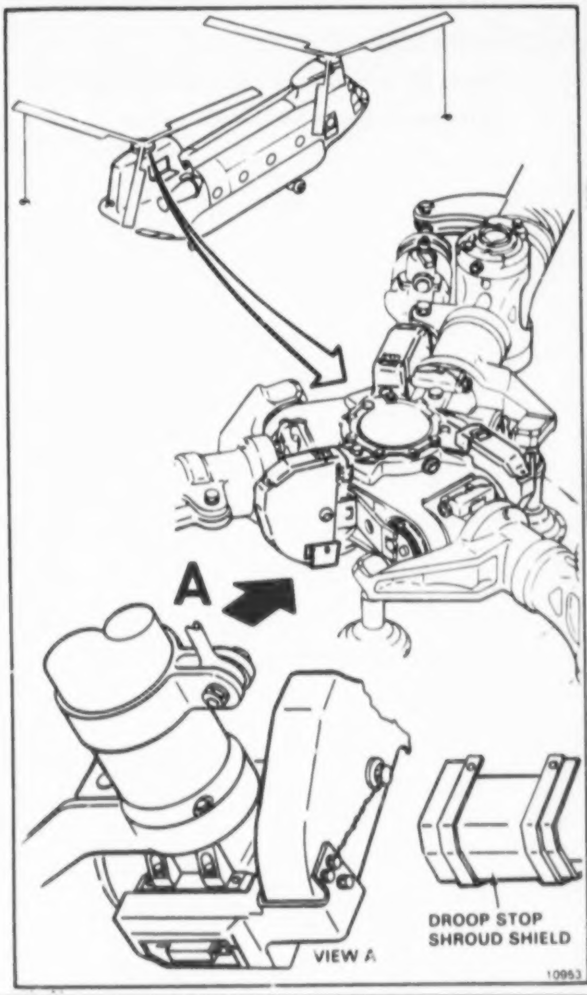
Personnel Required:

Medium Helicopter Repairer

Inspector

References:

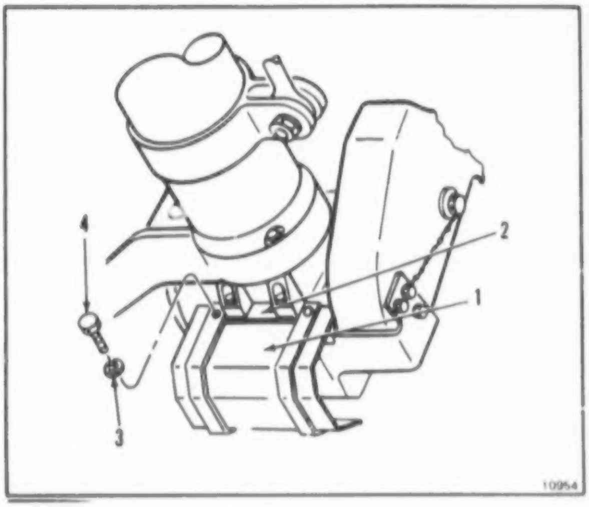
TM 55-1520-240-23P



NOTE

There are three droop stop shroud shields. Procedure is same to install any droop stop shroud shield.

1. **Position droop stop shroud shield (1)** on droop stop (2). **Install two washers (3) and two bolts (4). Torque bolts to 22 inch-pounds .**
2. **Lockwire bolts (4).** Use lockwire (E231).



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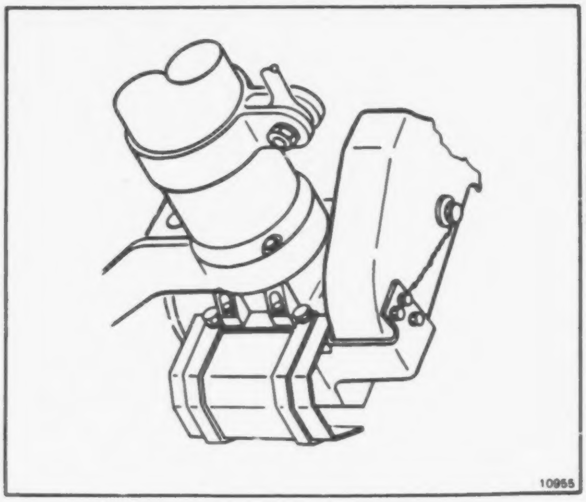
5-48.7 INSTALL DROOP STOP SHROUD SHIELD (Continued) 5-48.7

FOLLOW-ON MAINTENANCE:

Close aft pylon work platforms (Task 2-2).

Remove tiedown lines from blades.



END OF TASK

5-48.8 REMOVE DROOP STOP SHROUD ASSEMBLIES 5-48.8

INITIAL SETUP

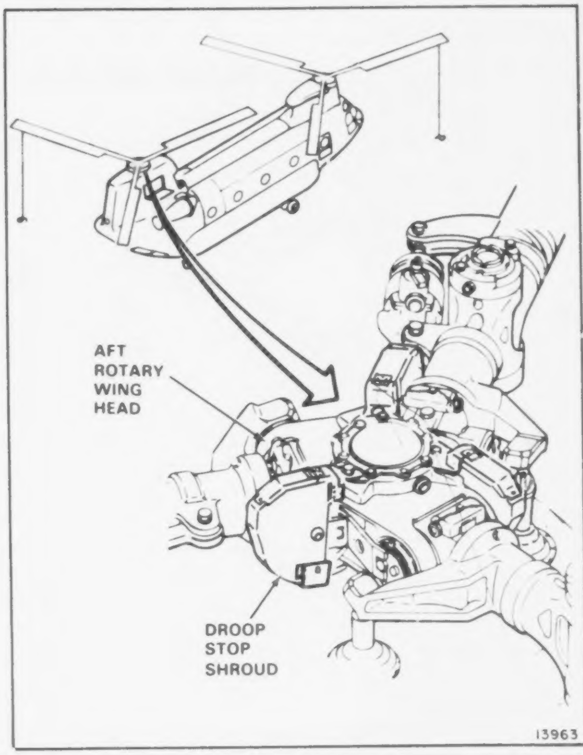
Applicable Configurations:
All

Tools:
Aircraft Mechanic Tool Kit,
NSN 5180-00-323-4692

Materials:
None

Personnel Required:
Medium Helicopter Repairer

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)
Aft Pylon Work Platform Open (Task 2-2)

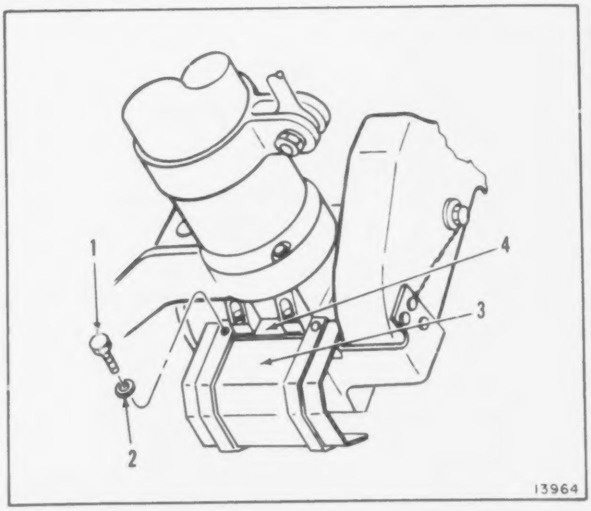


NOTE

There are three droop stop shroud assemblies on aft rotor head. Procedure is same to remove any assembly.

REMOVE SHIELD

1. Remove lockwire. Remove two bolts (1) and washers (2).
2. **Remove shield (3)** from droop stop (4).



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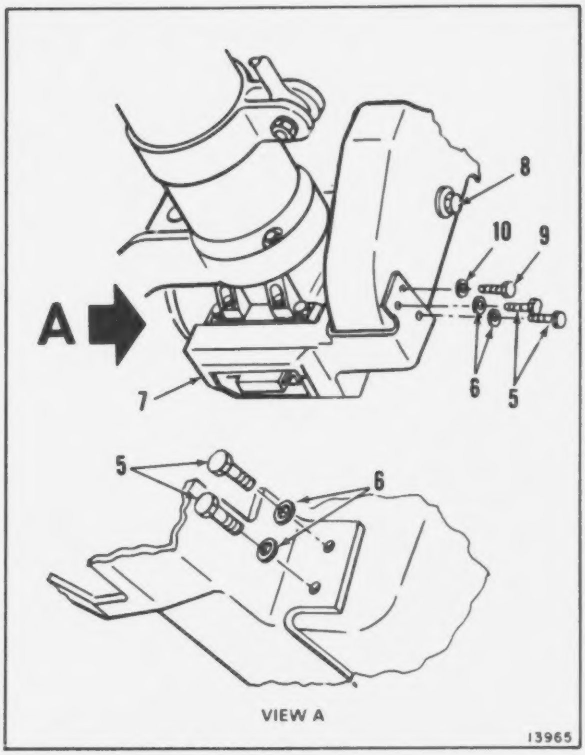
5-48.8 REMOVE DROOP STOP SHROUD ASSEMBLIES (Continued) 5-48.8

REMOVE BASE

3. **Remove four bolts (5) and washers (6)** from shroud base (7).
4. Remove lockwire from bolts (8 and 9). **Remove bolt (9)** and washer (10).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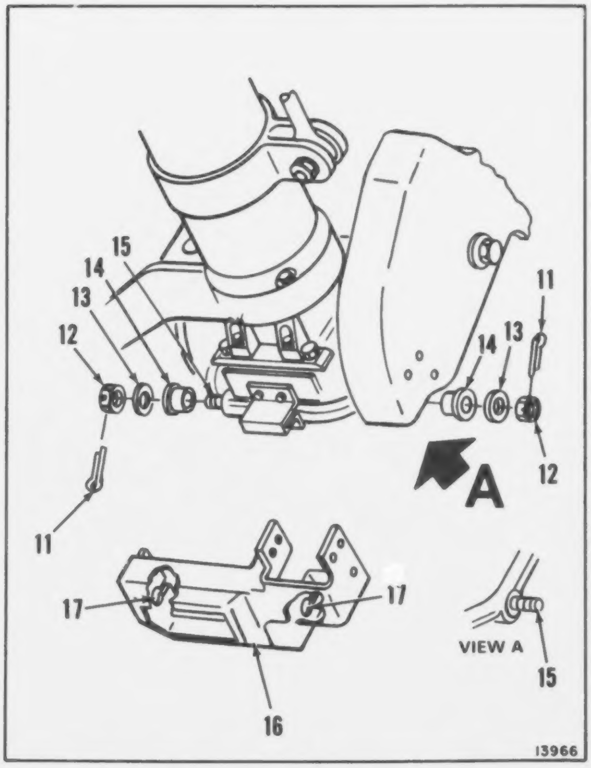
NOTE

Make sure bushings (14) have molded rubber liner installed.

5. **Remove** two cotter pins (11), **nuts (12)** washers (13), and bushings (14) from shaft (15).
6. **Slide droop stop shroud base (16) from shaft (15)** through slots (17). Remove base.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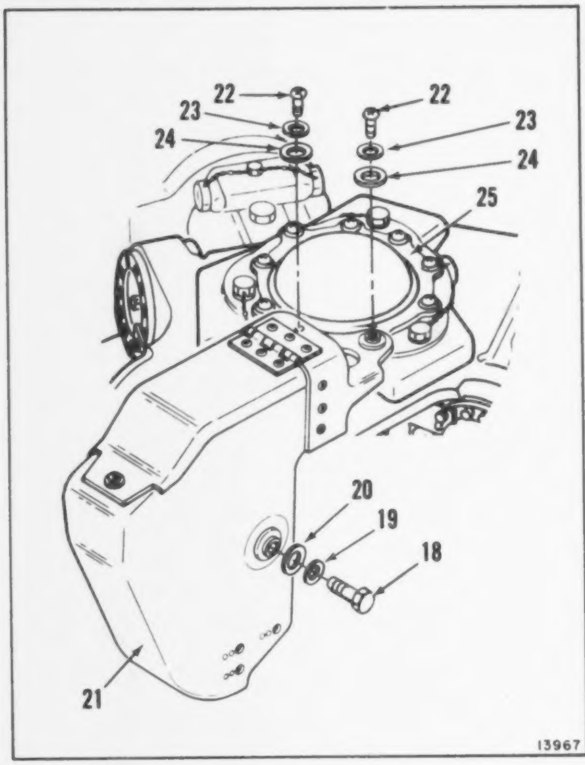
GO TO NEXT PAGE

5-48.8 REMOVE DROOP STOP SHROUD ASSEMBLIES (Continued) 5-48.8

REMOVE SHROUD

7. **Remove bolt (18)** and washers (19 and 20) from droop stop shroud (21).
8. **Remove two screws (22)** and washers (23 and 24) from shroud (21).
9. **Remove shroud (21)** from rotor head (25).



INSTALL HARDWARE

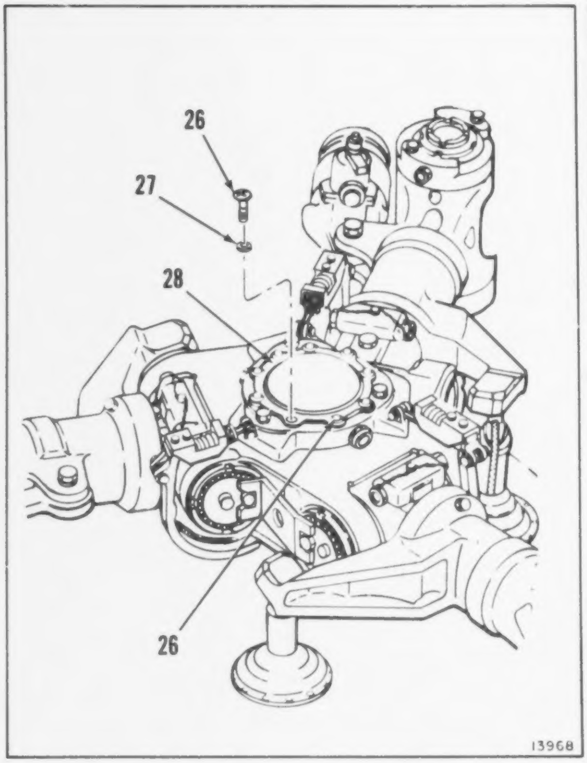
NOTE

Do not use screws removed with shroud.

10. **Install two screws (26)** and washers (27) from stowage bag in hub oil tank cover (28). **Torque screws to 23 inch-pounds.**

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-48.9 INSTALL DROOP STOP SHROUD ASSEMBLIES 5-48.9

INITIAL SETUP

Applicable Configurations:
All

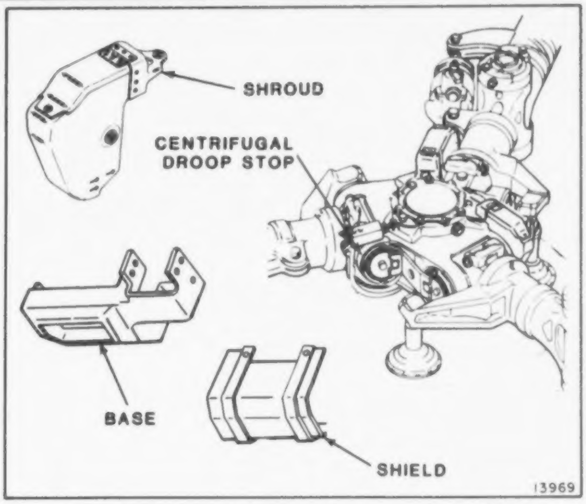
Tools:
Aircraft Mechanic Tool Kit, NSN 5180-00-323-4692
Torque Wrench, 0 to 150 Inch-Pounds

Materials:
Lockwire (E231)

Parts:
Cotter Pins

Personnel Required:
Medium Helicopter Repairer
Inspector

References:
TM 55-1520-240-23P

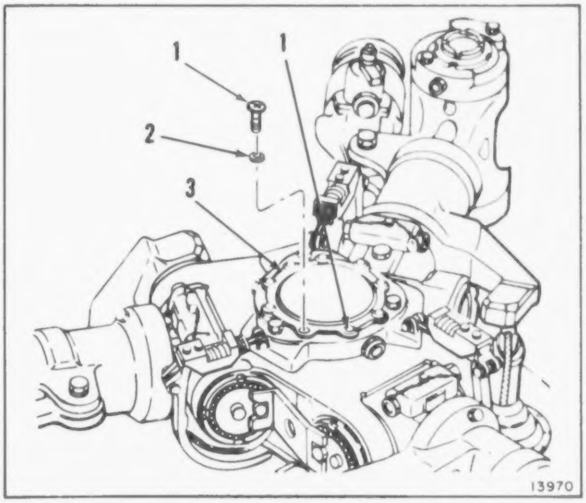


NOTE

There are three droop stop shroud assemblies on the aft rotor head. Procedure is same to install any assembly.

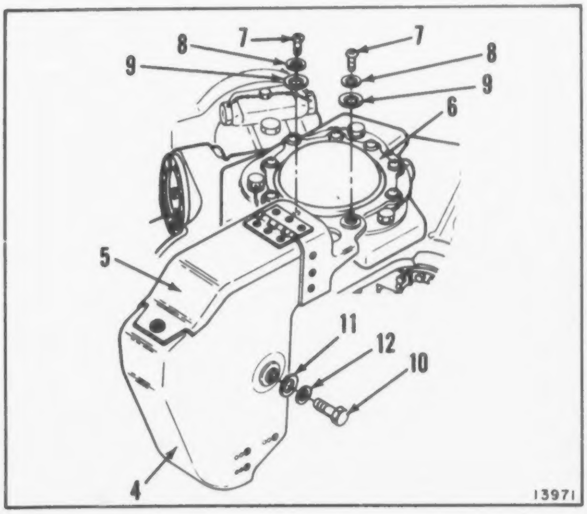
REMOVE HARDWARE

1. Remove two screws (1) and washers (2) from hub oil tank cover (3).



INSTALL SHROUD

2. **Position droop stop shroud (4),** hinged cover (5) up, **on rotor head (6).**
3. **Install screws (7)** and washers (8 and 9) in shroud (4). **Torque screws to 23 inch-pounds.**
4. **Install bolt (10)** and washers (11 and 12) in shroud (4). **Torque bolt to 110 inch-pounds.**

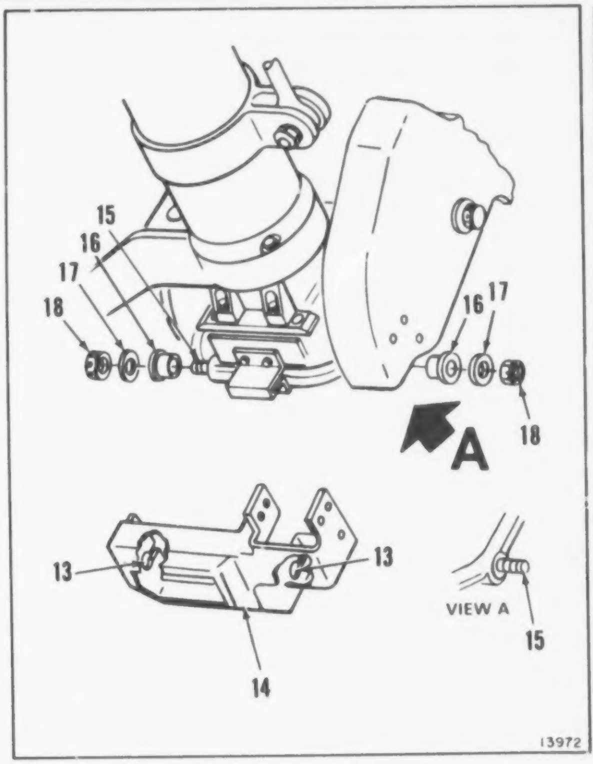


GO TO NEXT PAGE

5-48.9 INSTALL DROOP STOP SHROUD ASSEMBLIES (Continued) 5-48.9

INSTALL BASE

5. Align slots (13) of droop stop shroud base (14) with shaft (15). **Slide base on shaft.**
6. **Install bushings (16),** flange outboard, on shaft (15).
7. **Install washers (17) and nuts (18).** Do not tighten nuts at this time.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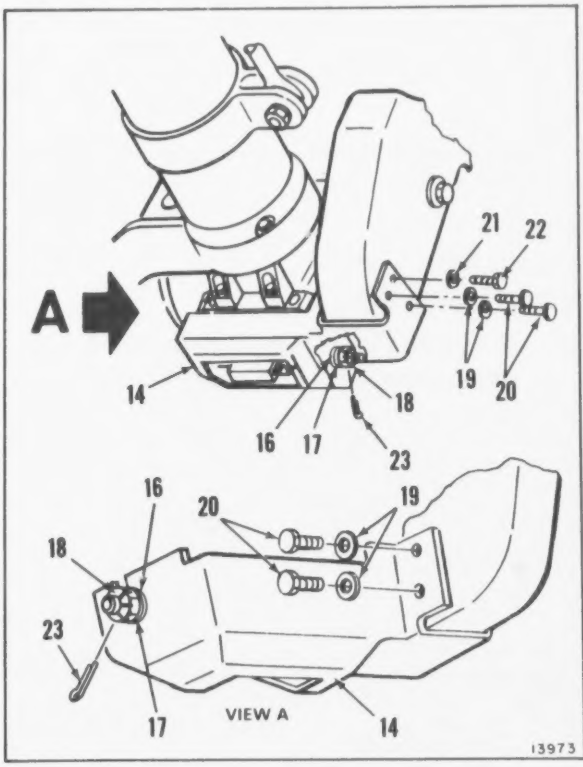
8. **Install four washers (19) and bolts (20)** in base (14). **Torque bolts to 70 inch-pounds.**
9. **Install washer (21) and bolt (22)** in base (14). **Torque bolt to 70 inch-pounds.**
10. **Tighten two nuts (18)** until rubber of bushings (16) is compressed 0.010 to 0.030 inch and cotter pin holes are aligned with nut slots. Use additional washers (17) if required. Install cotter pins (23).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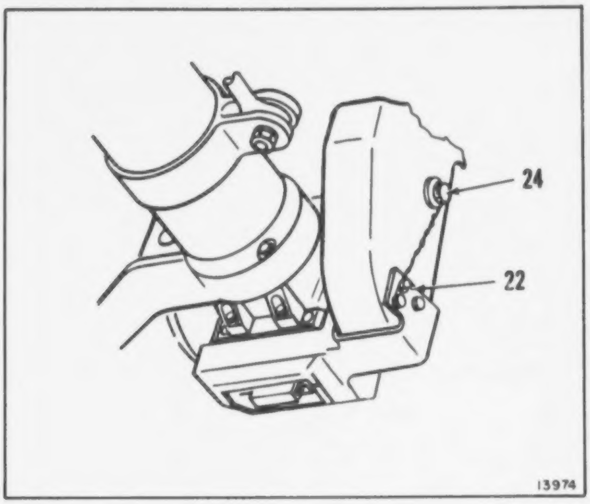
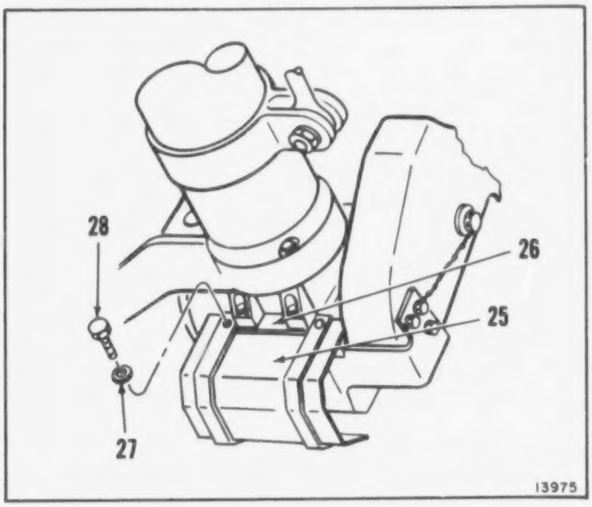
5-48.9 INSTALL DROOP STOP SHROUD ASSEMBLIES (Continued) 5-48.9

11. **Install lockwire between bolts (22 and 24).** Use lockwire (E231).



INSTALL SHIELD

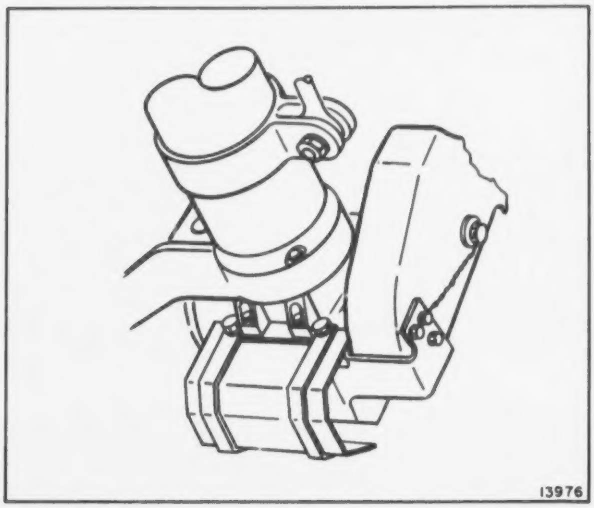
12. **Position droop stop shroud shield (25)** on droop stop (26). **Install two washers (27) and two bolts (28). Torque bolts to 23 inch-pounds.**
13. **Lockwire bolts (28).** Use lockwire (E231).



FOLLOW-ON MAINTENANCE:

Close aft pylon work platforms (Task 2-2).

Remove tiedown ropes from blades.



END OF TASK

5-49 INSPECT AND ADJUST INTERPOSER SUPPORT SPRING-BACK 5-49

INITIAL SETUP

Applicable Configurations:
With 24

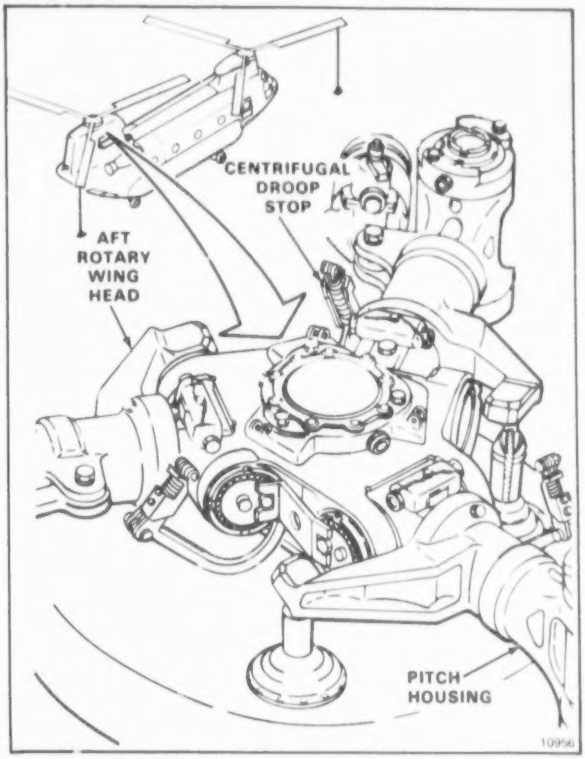
Tools:
Aircraft Mechanic Tool Kit,
NSN 5180-00-323-4692

Materials:
None

Personnel Required:
Medium Helicopter Repairer (5)
Inspector

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line Installed On One Forward and One Aft Blade (Task 1-26)
Aft Pylon Work Platforms Open (Task 2-2)
Droop Stop Shrouds Removed (Task 5-48.3

General Safety Instructions:



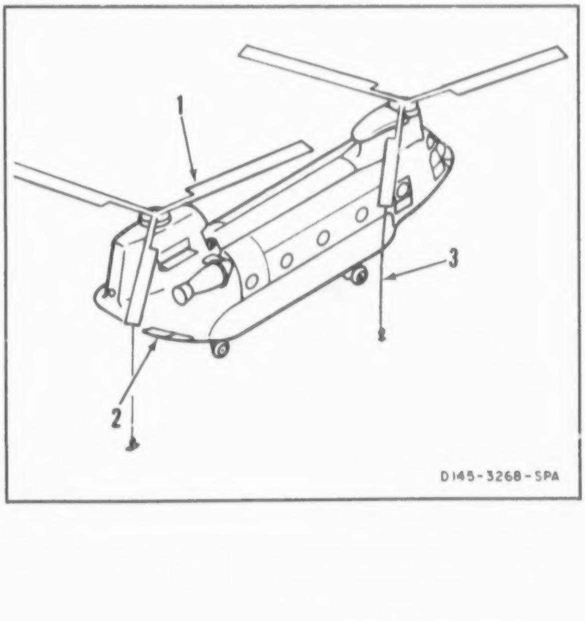
WARNING

Do not lower blade suddenly. Personnel can be injured if blade is lowered suddenly while droop stop work is in progress.

NOTE

- Procedure is same to adjust spring-back of any centrifugal droop stop interposer support.
- There is a centrifugal droop stop support for each rotor blade.
- Blade at the support to be adjusted must be positioned over fuselage.

1. Position blade (1) over fuselage (2). Use tiedown line (3). Tie down one forward blade.



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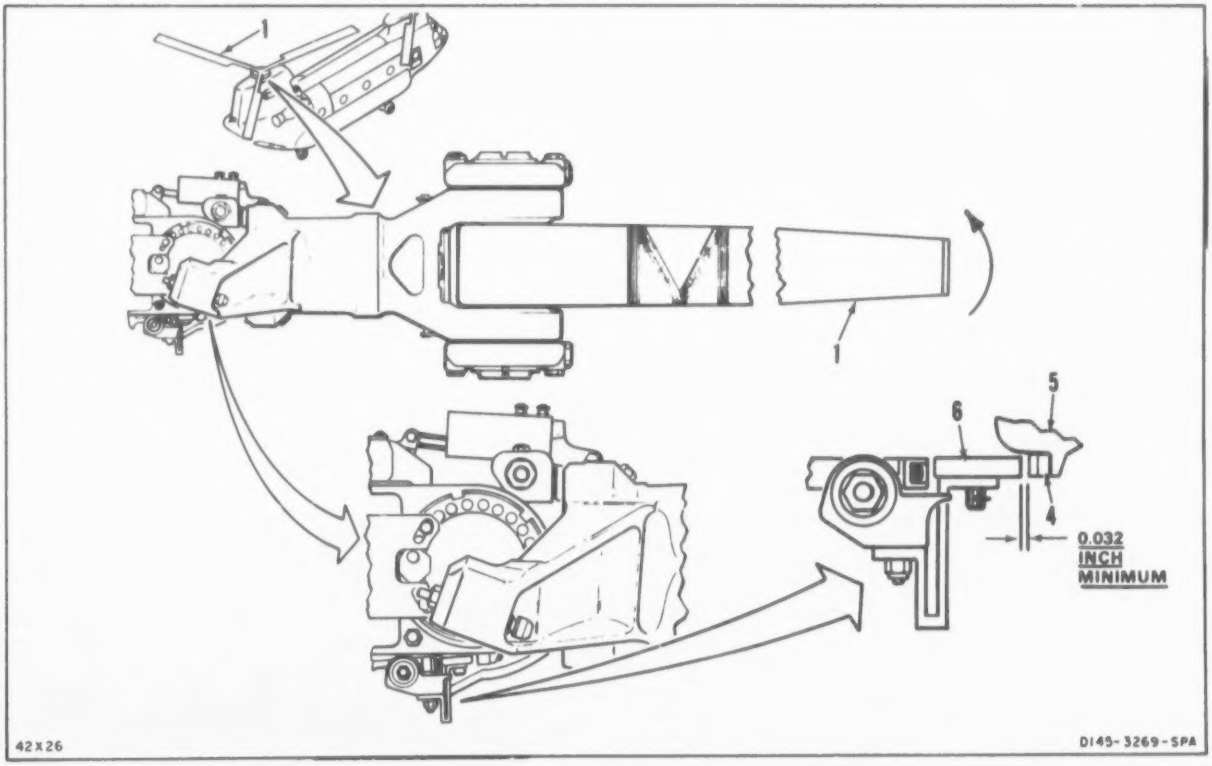
5-49 INSPECT AND ADJUST INTERPOSER SUPPORT SPRING-BACK (Continued) 5-49

2. Have helpers lift and support blade (1) until task is complete.
3. **Measure distance between fixed droop stop (4),** on pitch shaft (5), **and interposer block (6).** Distance shall be at least 0.032-inch. Use feeler gage.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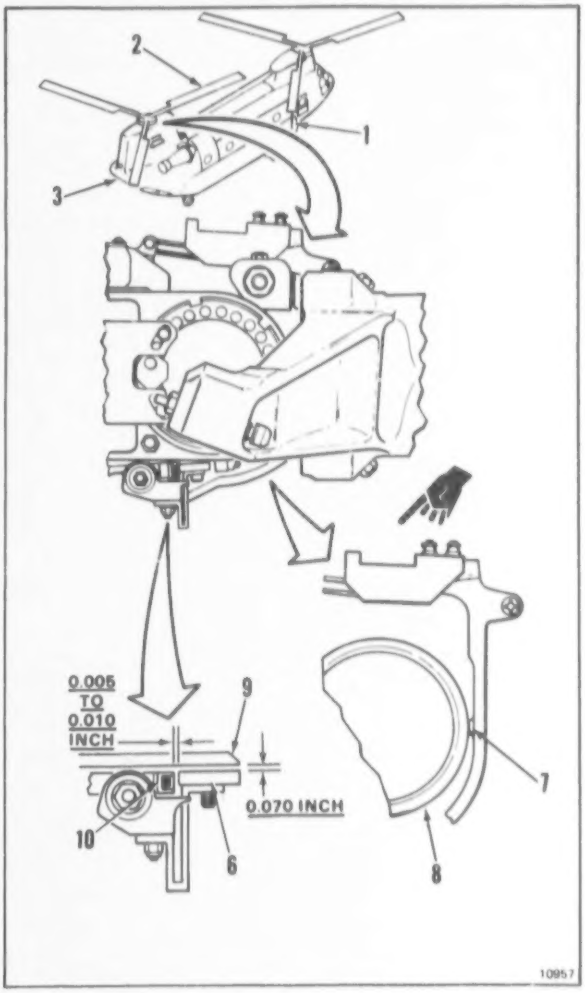
5-49 INSPECT AND ADJUST INTERPOSER SUPPORT SPRING-BACK (Continued) 5-49

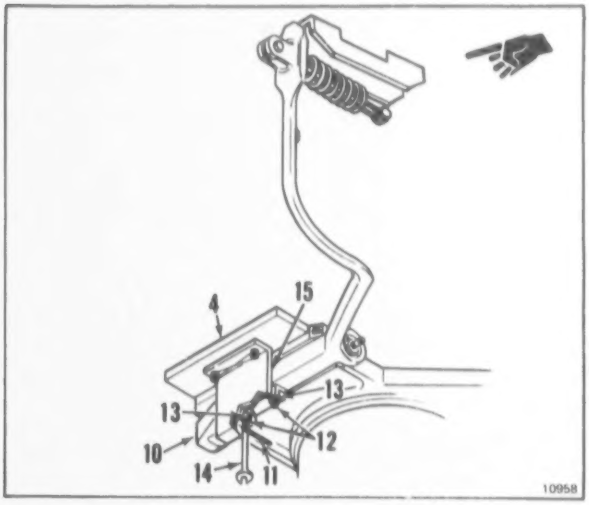
4. Check that balancing arm stop (7) rests against trailing lug (8).
5. **Measure distance between interposer block (6) and hub (9).** Distance shall be 0.000 inch to 0.070 inch. Use feeler gage.
6. **Measure distance between interposer block (6) and striker block (10).** Distance shall be 0.005 to 0.010 inch measured at both ends of interposer block. Use feeler gage.



NOTE

- If distance between interposer block and striker block is between 0.005 and 0.010 inch, go to Step 8.
- If distance between interposer block and striker block is not between 0.005 and 0.010 inch, go to Step 7.

7. **Adjust interposer support (15)** as follows:
   a. Insert socket-head screw key (11) in two blind bolts (12). Loosen two locknuts (13). Use open-end wrench (14).
   b. Slide slotted interposer support (15) until distance between interposer block (6) and striker block (10) is between 0.005 and 0.010-inch. Distance must be equal at both ends.
   c. Insert socket-head screw key (11) in two blind bolts (12). Tighten two locknuts (13). Use open-end wrench (14).



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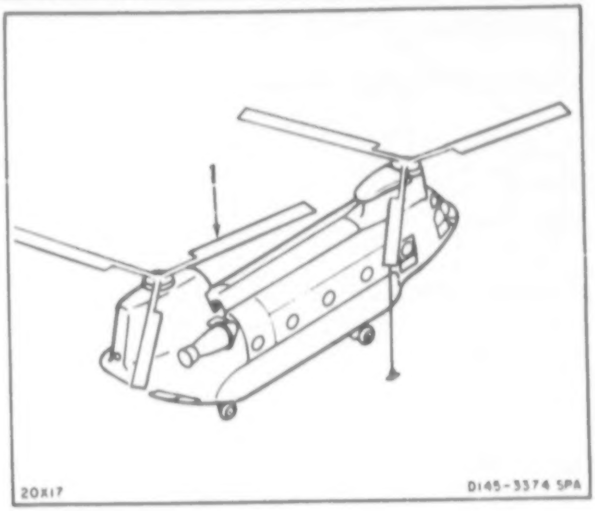
5-49 INSPECT AND ADJUST INTERPOSER SUPPORT SPRING-BACK (Continued) 5-49

8. Have helpers lower blade (1).

FOLLOW-ON MAINTENANCE:

Install aft droop stop shroud (Task 5-48.5).

Close aft pylon work platforms (Task 2-2).



END OF TASK

5-50 INSPECT CENTRIFUGAL DROOP STOP SPRINGS AND BALANCING ARMS 5-50

INITIAL SETUP

Applicable Configurations:
All

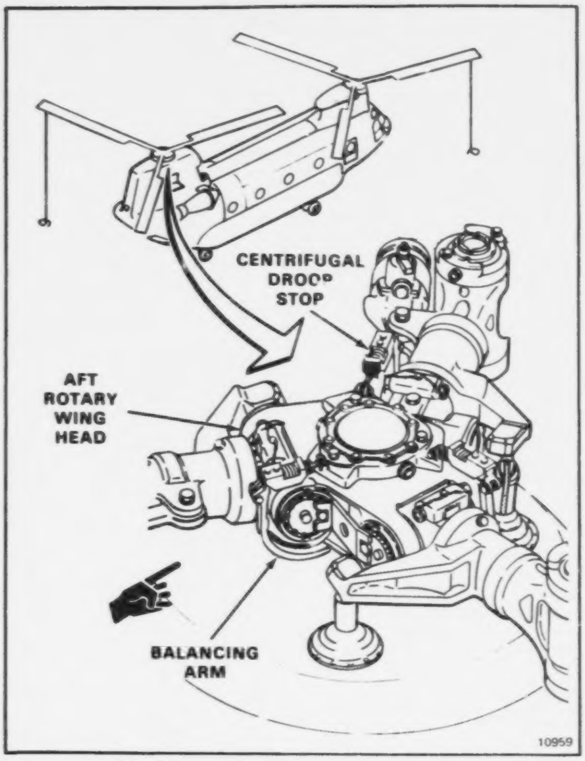
Tools:
None

Materials:
None

Personnel Required:
Inspector

References:
Task 5-52
Task 5-53

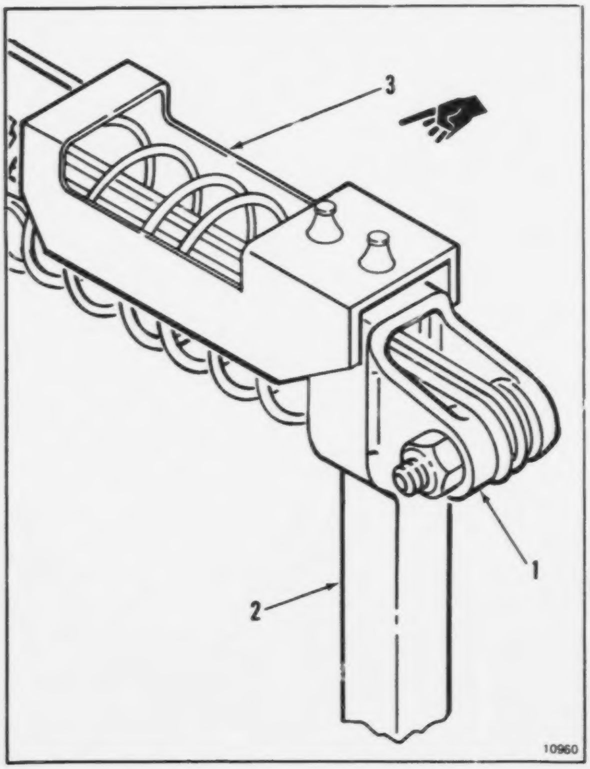
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Blade Tied Down (Task 1-26)
Aft Pylon Work Platforms Open (Task 2-2)
Droop Stop Shrouds Removed (Task 5-48.3)



NOTE

Procedure is same to inspect any centrifugal droop stop spring and balancing arm.

1. **Check lugs (1)** for cracks, damage, and visible wear (Task 5-53).
2. **Check balancing arms (2) and weights (3).** Arms shall be installed securely. There shall be no twists, bends or dents.



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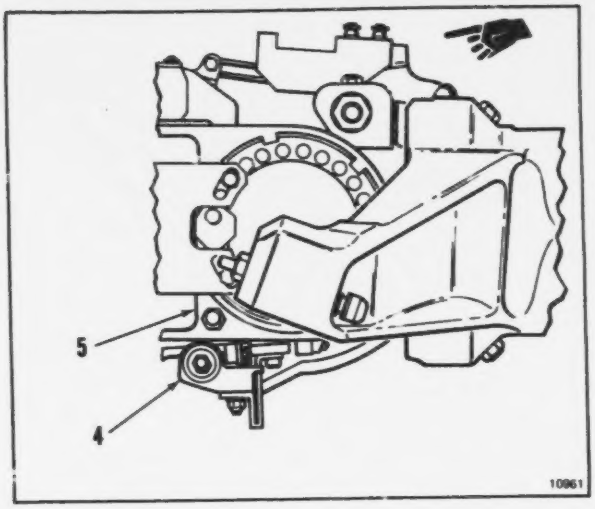
5-50 INSPECT CENTRIFUGAL DROOP STOP SPRINGS AND BALANCING ARMS (Continued) 5-50

3. **Check for clearance between lugs (4) and hub (5)** (Task 5-52).



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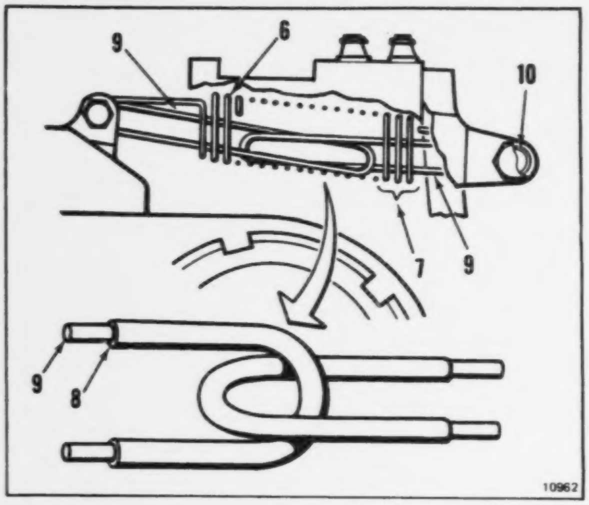
5-50 INSPECT CENTRIFUGAL DROOP STOP SPRINGS AND BALANCING ARMS (Continued) 5-50



4. **Check springs (6).** Coils (7) shall align and spacing shall be uniform.
5. **Check sleeves (8) on limiter springs (9).** Sleeves may be worn through if wire diameter is not less than 0.090 inch.

CAUTION

Do not spread individual spring coils more than 1/4 inch. Overspreading will weaken spring.

NOTE

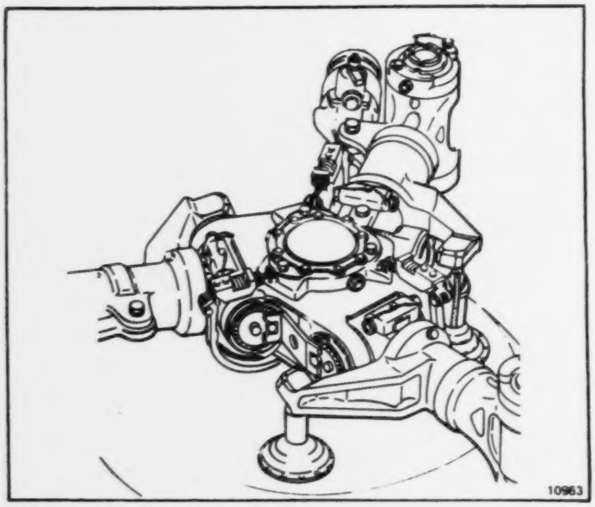
If necessary, remove springs and limiters for inspection.

6. Inspect springs (6) for wear as follows:
   a. Spread spring coils (7). Raise limiters (9) from inside bottom diameter of spring (6). Inspect limiters and inside diameter of spring for wear.
   b. Reject spring if wire diameter is less than 0.050 inch. Reject limiter if wire diameter is less than 0.090 inch.
   c. Pull spring inward toward hub center so spring loops within the yoke opening can be seen. Inspect sides of spring (6) for wear where it passes around grommet (10). Refer to step b. for rejection data.
   d. Inspect spring (6) for wear where it passes around bolts at each end. Refer to step b. for rejection data.

FOLLOW-ON MAINTENANCE:

Install droop stop shrouds (Task 5-48.5)

Close aft pylon work platform (Task 2-2).



END OF TASK

5-51 INSPECT CENTRIFUGAL DROOP STOP INTERPOSER BLOCK AND SUPPORT, STRIKER BLOCK, AND FIXED DROOP STOP 5-51

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692

Materials:
None

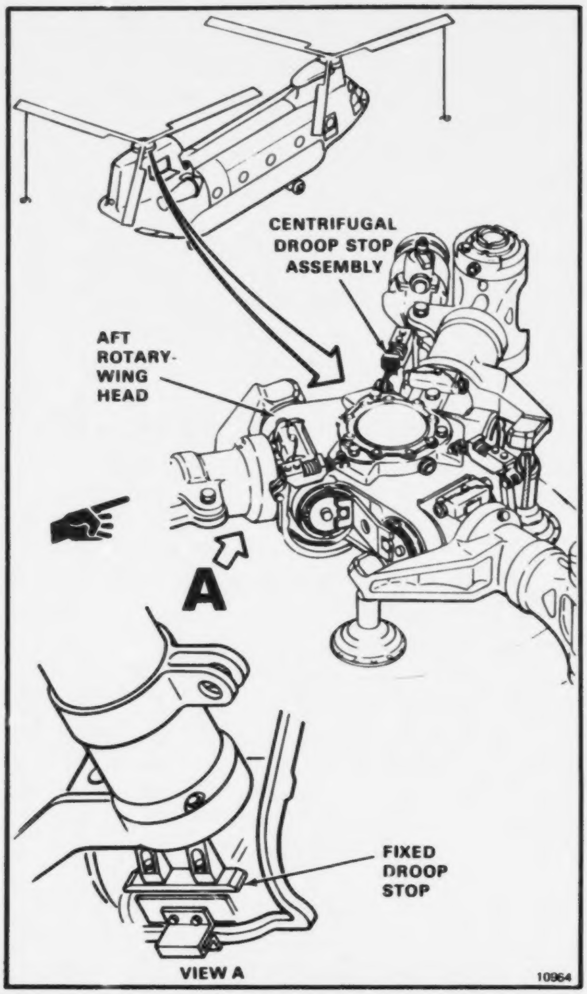
Personnel Required:
Medium Helicopter Repairer (4)
Inspector

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line on One Forward and One Aft Blade (Task 1-26)
Aft Pylon Work Platforms Open (Task 2-2)
Droop Stop Shrouds Removed (Task 5-48.3)

General Safety Instructions:

WARNING

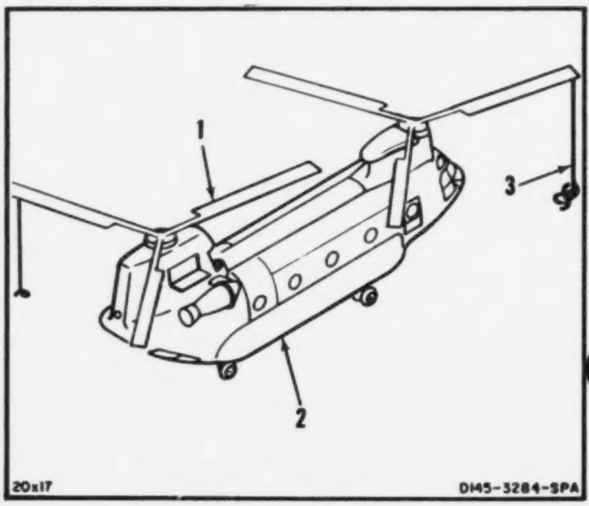
Do not lower blade suddenly. Personnel can be injured if blade is lowered suddenly while droop stop work is in progress.



NOTE

- There are three fixed droop stops, and three centrifugal droop stops with support and blocks. Procedure is same to inspect any fixed droop stop, and centrifugal droop stop support and blocks.
- Blade for fixed droop stop, support and blocks to be inspected, must be positioned over fuselage.

1. Position blade (1) over fuselage (2). Use tiedown line (3). Tie down one forward and one aft blade.



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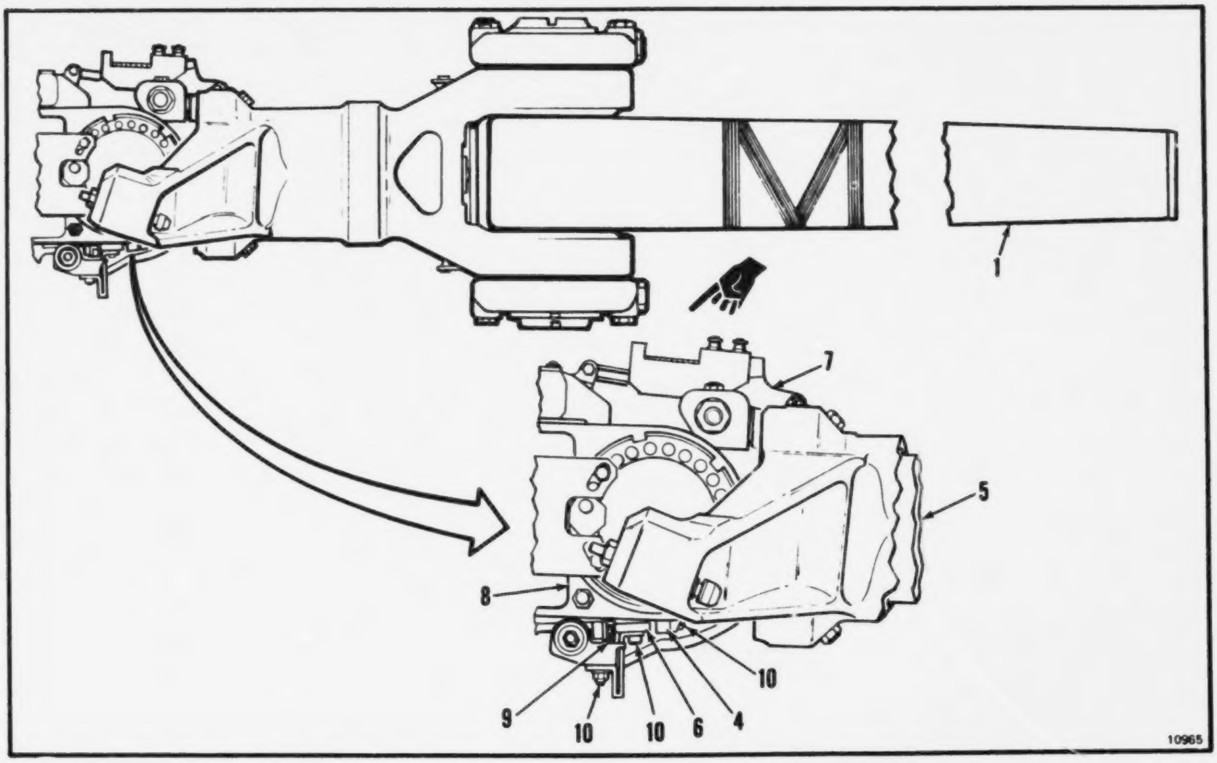
5-51 INSPECT CENTRIFUGAL DROOP STOP INTERPOSER BLOCK AND SUPPORT, STRIKER BLOCK, AND FIXED DROOP STOP (Continued) 5-51

2. Have helpers lift blade (1) until fixed droop stop (4) on shaft (5)is clear of interposer block (6). Support blade.
3. **Pull balancing arm (7) away from hub (8)** until interposer block (6) clears striker block (9) and fixed droop stop (4).
4. **Check interposer block (6), striker block (9), and fixed droop stop (4)** for damage that changes shape of a block or stop. There shall be no damage that changes shape of a block or stop.
5. **Check six screws (10).** There shall be no loose or sheared screws.
6. Return balancing arm (7) until it rests against hub (8).
7. Have helpers lower blade (1).



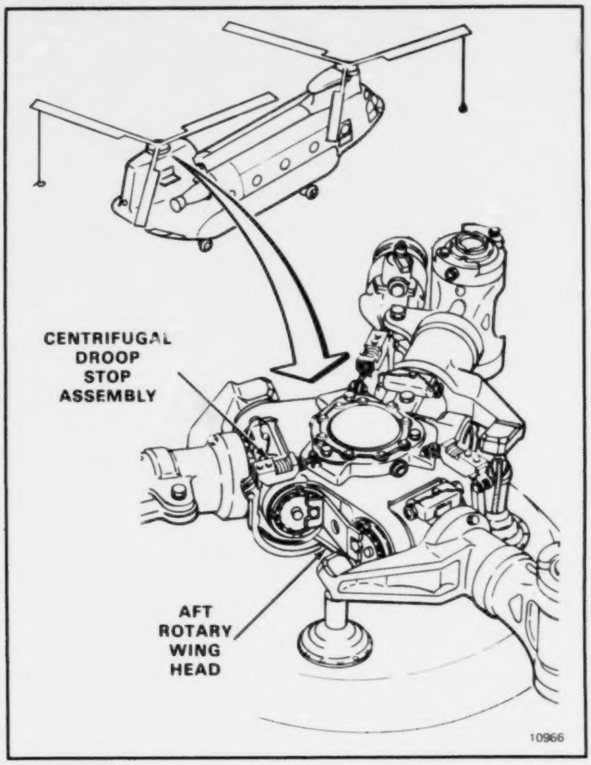
FOLLOW-ON MAINTENANCE:

Install droop stop shrouds (Task 5-48.5).

Close aft pylon work platforms (Task 2-2).

END OF TASK

5-52 CENTRIFUGAL DROOP STOP FUNCTIONAL CHECK 5-52



INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool kit, NSN 5180-00-323-4692

Materials:

Wash Primer (E302)
Epoxy Primer (E292)
Black Lacquer (E215)
Cloths (E120)
Gloves (E186)
Masking Tape (E388)

Personnel Required:

Medium Helicopter Repairer (5)
Inspector

References:

MIL-F-18264
Task 5-54
Task 5-55

Equipment Condition:

Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)
Aft Pylon Work Platform Open (Task 2-2)
Droop Stop Shroud Removed (Task 5-48.3)

General Safety Instructions:

WARNING

Do not lower blade suddenly. Personnel can be injured if blade is lowered suddenly while droop stop work is in progress.

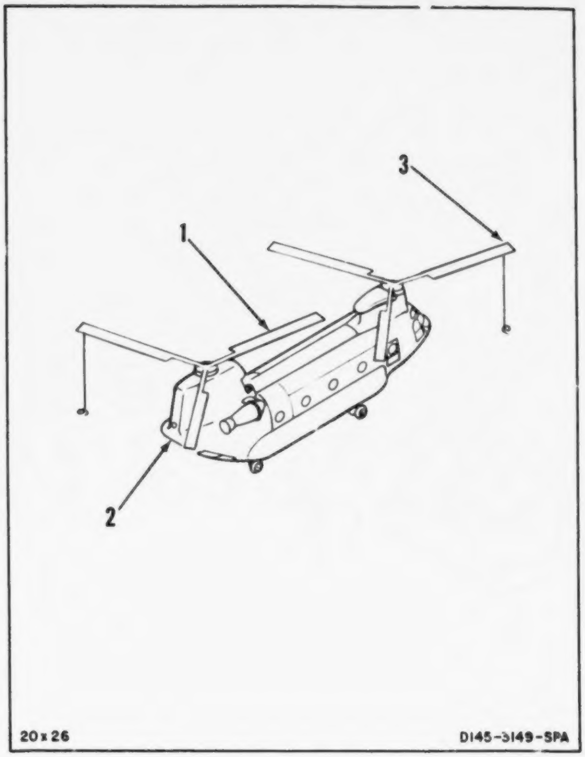
GO TO NEXT PAGE

5-52 CENTRIFUGAL DROOP STOP FUNCTIONAL CHECK (Continued) 5-52

NOTE

- Procedure is same for functional check of any centrifugal droop stop.
- One rotor blade is connected to each centrifugal droop stop. Centrifugal droop stops are installed only on aft rotary wing head.
- Blade for centifugal droop stop to be checked must be positioned over fuselage.

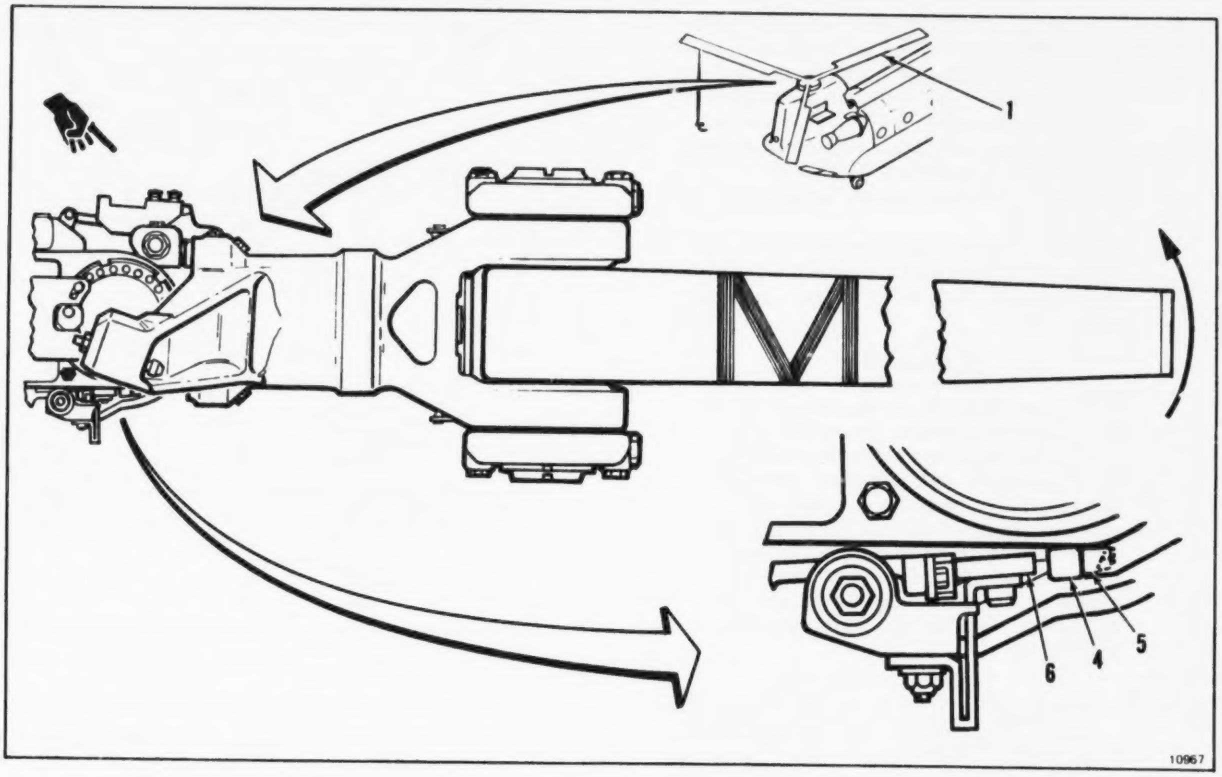
1. Position blade (1) over fuselage (2). Use tiedown line (3). Tie down one forward blade.



GO TO NEXT PAGE

5-52 CENTRIFUGAL DROOP STOP FUNCTIONAL CHECK (Continued) 5-52

2. Have helpers lift blade (1) until fixed droop stop (4) on pitch shaft (5) is clear of interposer block (6). Support blade.



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5-52 CENTRIFUGAL DROOP STOP FUNCTIONAL CHECK (Continued) 5-52

CAUTION

Balancing arms must move freely when blade is raised. Fuselage can be damaged if there is interference with balancing arm operation.

3. **Move balancing arm (7)** outward **as far as it will go. Check** that **spring (8)** is clear of other parts. There shall be no interference with spring operation.
4. **Check pivot bearing (9)** for binding. There shall be no binding.
5. **Check for interference at interposer block (6).** There shall be no interference.
6. **Check that there is clearance between balancing arm pivot lugs (10) and bottom of hub (11).** If there is clearance, go to step 9. **If there is no clearance, do steps 7 thru 8.**
7. Remove centrifugal droop stop assembly (Task 5-54).

7.1. Remove enough metal from top of lugs (10) to provide clearance. Use smooth file.

7.2. Finish reworked area of lugs (10) as follows:

WARNING

Alodine (E65) is an oxidizer. Discard cloths which contain this material in a separate container. If discarded with cloths contaminated with acetone, mek, or other organic solvents, combustion can result. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

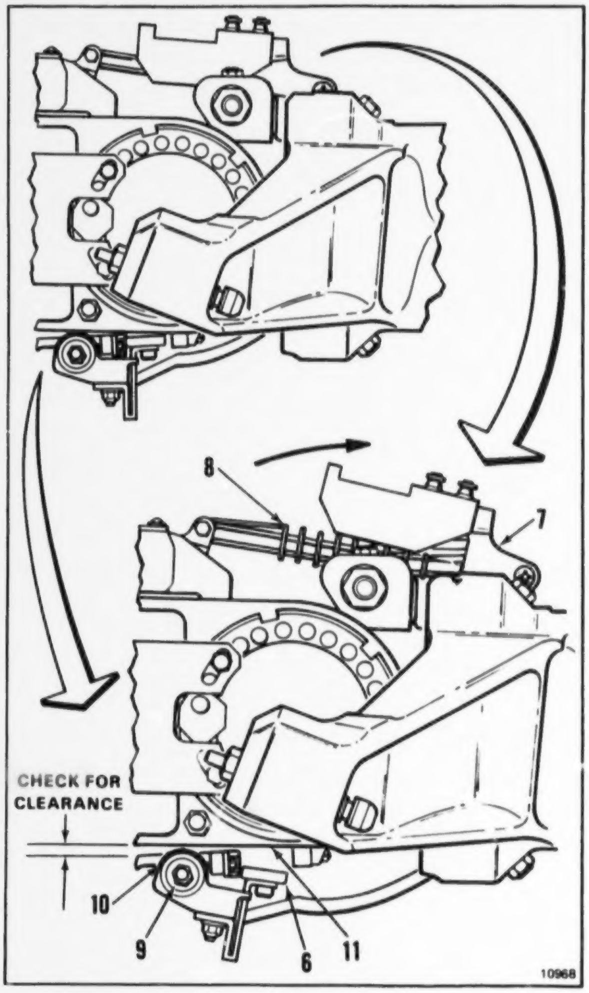
a. Mix 3 ounces of alodine powder (E65) with 1/2 ounce of concentrated nitric acid (E22). Add mixture to 1 gallon of water.

b. Apply alodine solution to reworked area of lugs. Wear gloves (E186).

c. Rinse surface with cold water and let air dry.

WARNING

Epoxy primer (E292) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes. Use gloves (E186).



d. Apply one coat of epoxy primer (E292). Wear gloves (E186). Use tape (E388) to protect other components.

e. Apply two more coats of epoxy primer (E292). Allow 1 hour between coats. Wear gloves (E186).

f. Apply two coats of black lacquer (E215) per MIL-F-18264. Allow 30 minutes between coats. Wear gloves (E186).

7.3. Install centrifugal droop stop assembly (Task 5-55).

8. Check for clearance as in step 6.

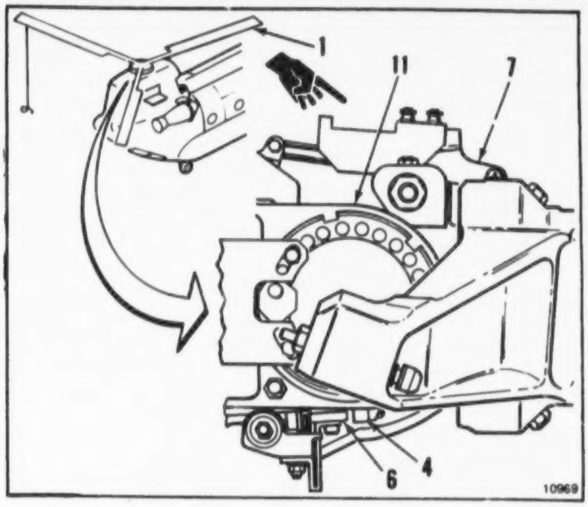
GO TO NEXT PAGE

5-52 CENTRIFUGAL DROOP STOP FUNCTIONAL CHECK (Continued) 5-52

WARNING

Do not lower rotary wing blade without warning personnel working on droop stops. Personnel can be injured if blade is lowered suddenly.

9. **Return balancing arm (7) slowly until it rests against hub (11).** Have helpers lower blade (1) slowly until fixed droop stop (4) rests against interposer block (6).



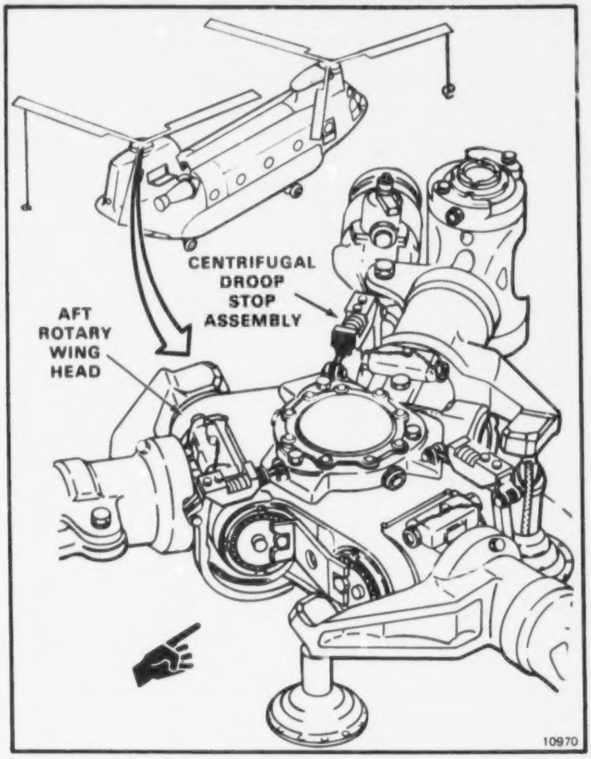
FOLLOW-ON MAINTENANCE:

Install droop stop shroud (Task 5-48.5).

Close aft pylon work platforms (Task 2-2).

END OF TASK

5-53 INSPECT ROTOR HEAD CENTRIFUGAL DROOP STOP BOLTS AND LUGS 5-53



INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Technical Inspection Tool Kit, NSN 5180-00-323-5114

Materials:
None

Personnel Required:
Medium Helicopter Repairer (4)
Inspector

References:
Task 5-50
Task 5-57

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)
Aft Pylon Work Platforms Open (Task 2-2)
Droop Stop Shrouds Removed (Task 5-48.3)

General Safety Instructions:

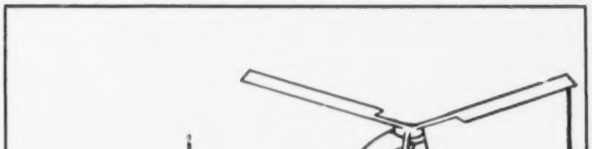
WARNING

Do not lower blade suddenly. Personnel can be injured if blade is lowered suddenly while droop stop work is in progress.

NOTE

- There are three centrifugal droop stops. Procedure is same for removal of any centrifugal droop stop.
- One rotor blade is connected to each centrifugal droop stop. Blade for centrifugal droop stop to be inspected must be positioned over fuselage.

1. Position blade (1) over fuselage (2). Use tiedown line (3). Tie down one forward and one aft blade.



GO TO NEXT PAGE

5-53 INSPECT ROTOR HEAD CENTRIFUGAL DROOP STOP BOLTS AND LUGS (Continued) 5-53

2. Have helpers lift and support blade (1) at tip.
3. Remove cotter pin (4), nut (5), and two washers (6) from bolt (7) through hub oil tank lugs (8).

NOTE

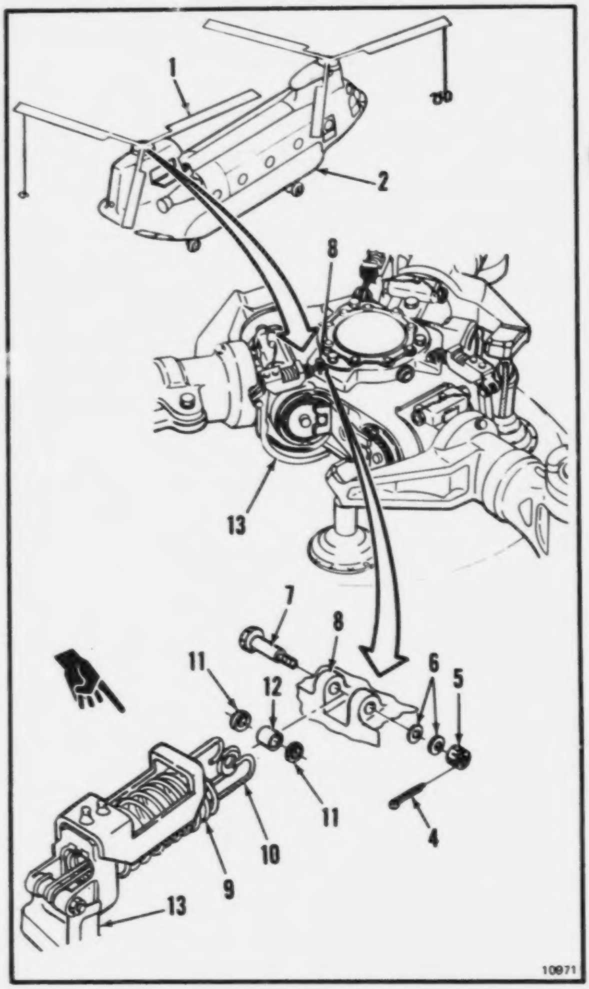
Support spring load before removing bolt. Sudden release of spring will cause small parts to fly out of lugs.

4. Support extension spring (9) and remove bolt (7). **Remove extension spring, limiter spring (10),** two washers (11) and bearing (12) from hub oil tank lugs (8).
5. Lower balancing arm (13) slowly.

NOTE

Blade may have to be lifted higher if balancing arm is not free to be lowered.

6. Have helpers lower blade (1) until it is at rest about 6 inches above fuselage (2).



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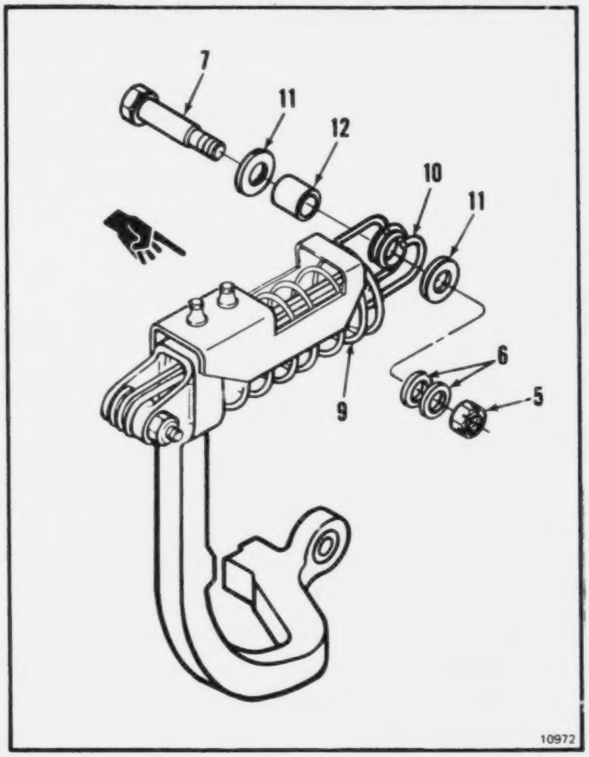
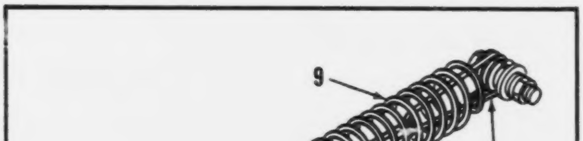
5-53 INSPECT ROTOR HEAD CENTRIFUGAL DROOP STOP BOLTS AND LUGS (Continued) 5-53

7. **Check bearing (12) for grooves.** Depth of grooves shall not exceed 0.031 inch.
8. **Check bolt (7) for wear or thread damage.** There shall be no wear or thread damage.
9. Temporarily install bolt (7) through two washers (11), bearing (12), limiter spring (10), and extension spring (9). Install two washers (6) and nut (5) loosely on bolt.



10. Remove cotter pin (13), nut (14), and two washers (15) from bolt (16) through balancing arm lugs (17).
11. **Remove** bolt (16), **extension spring (9), limiter spring (10),** two washers (18), and bearing (19) from balancing arm lugs (17).
12. **Check bearing (19) for grooves** caused by limiter spring (10). Depth of grooves shall not exceed 0.031 inch.
13. Temporarily install bolt (16) through two washers (18), extension spring (9), limiter spring (10), and bearing (19). Install two washers (15) and nut (14) loosely on bolt.



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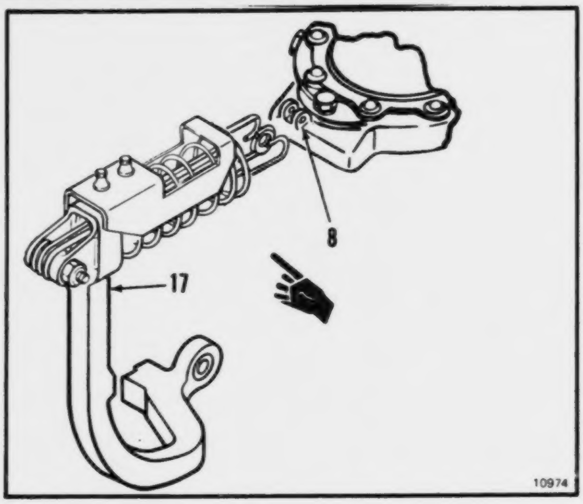
5-53 INSPECT ROTOR HEAD CENTRIFUGAL DROOP STOP BOLTS AND LUGS (Continued) 5-53

14. **Check inside faces of oil tank lugs (8).** There shall be no cracks or wear.
15. **Check inside faces of balancing arm lugs (17).** There shall be no cracks or wear.

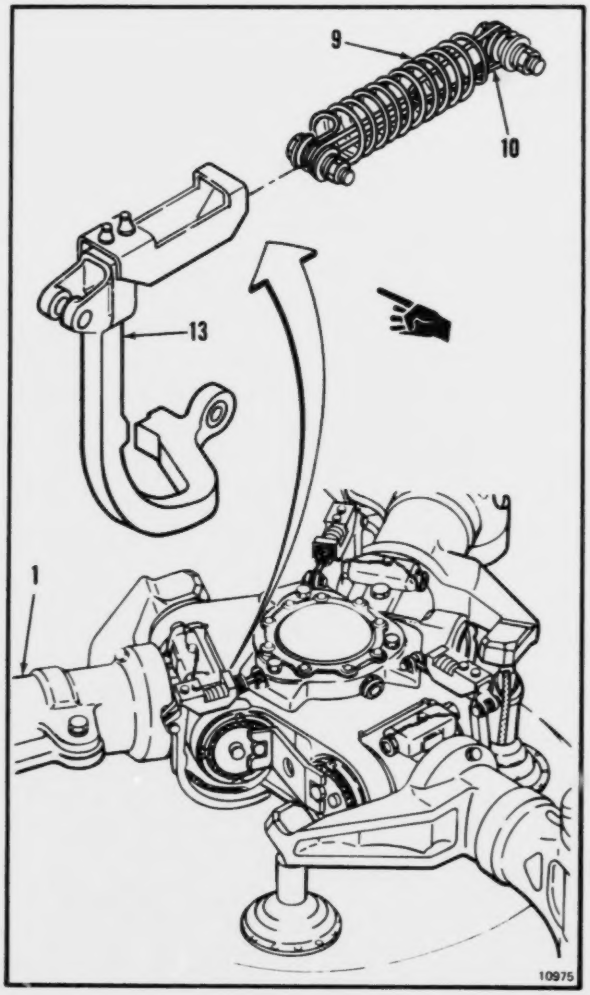


16. **Check extension spring (9), limiter springs (10), and balancing arm (13)** (Task 5-50).
17. Have helpers lift and support blade (1) at tip.
18. **Lift balancing arm (13). Install extension spring (9) and limiter springs (10)** (Task 5-57).
19. Have helpers lower blade (1).

FOLLOW-ON MAINTENANCE:

Install droop stop shrouds (Task 5-48.5).

Close aft pylon work platforms (Task 2-2).



END OF TASK

5-54 REMOVE CENTRIFUGAL DROOP STOPS 5-54

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Materials:

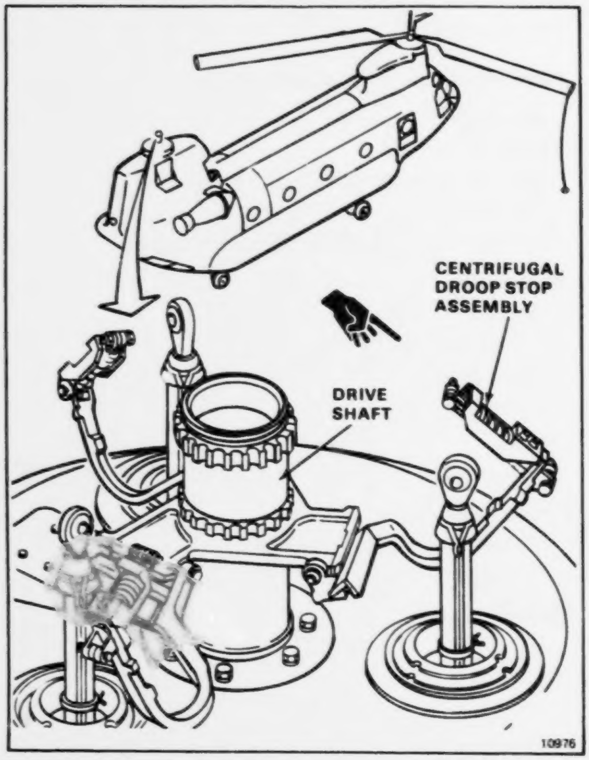
Twine (E433)

Personnel Required:

Medium Helicopter Repairer (2)

Equipment Condition:

Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward Blade Tied-Down (Task 1-26)
Aft Rotary-Wing Blades Removed (Task 5-64)
Pylon Workstands Open (Task 2-2)
Aft Rotary-Wing Head Removed (Task 5-8)



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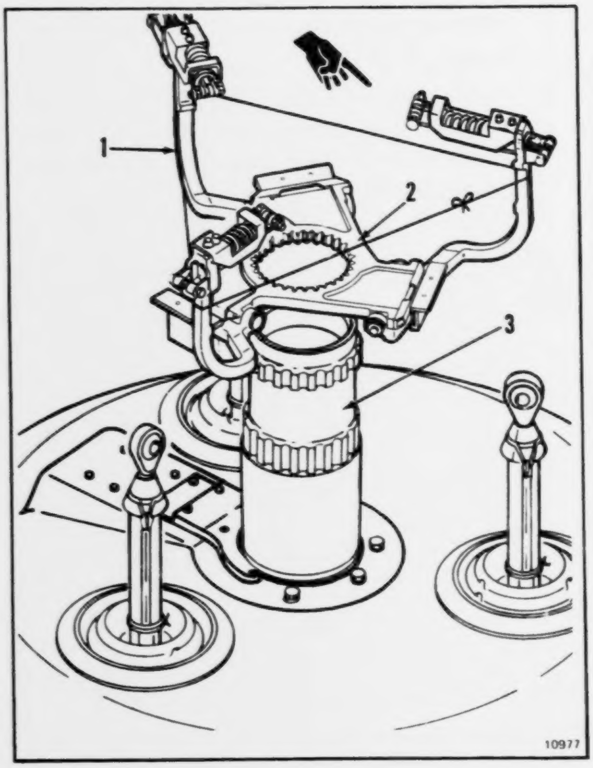
1. Tie three balancing arms (1) together. Use twine (E433).
2. **Remove centrifugal droop stop assembly (2)** from drive shaft (3).

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-55 INSTALL CENTRIFUGAL DROOP STOPS 5-55

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Torque Wrench, 5 to 55 Inch-Pounds

Materials:

Grease (E190)

Twine (E433)

Cloth (E120)

Gloves (E186)

Parts:

Cotter Pins

Personnel Required:

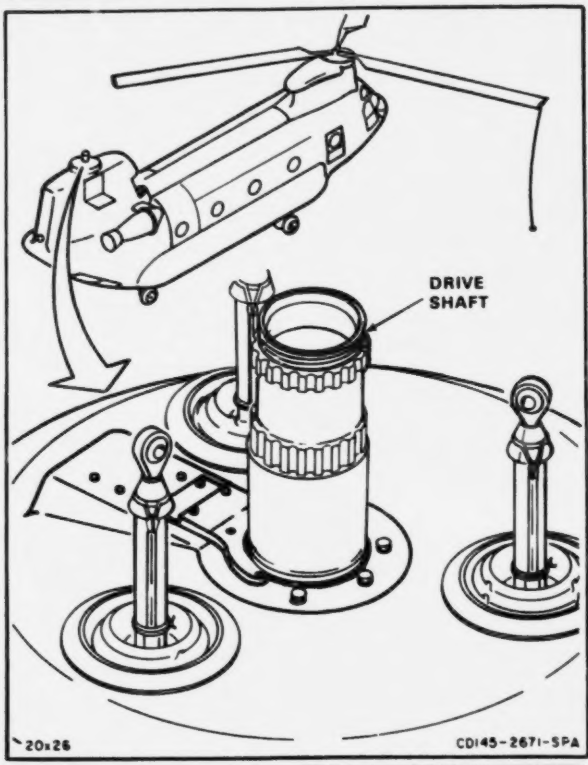
Medium Helicopter Repairer (2)

Inspector

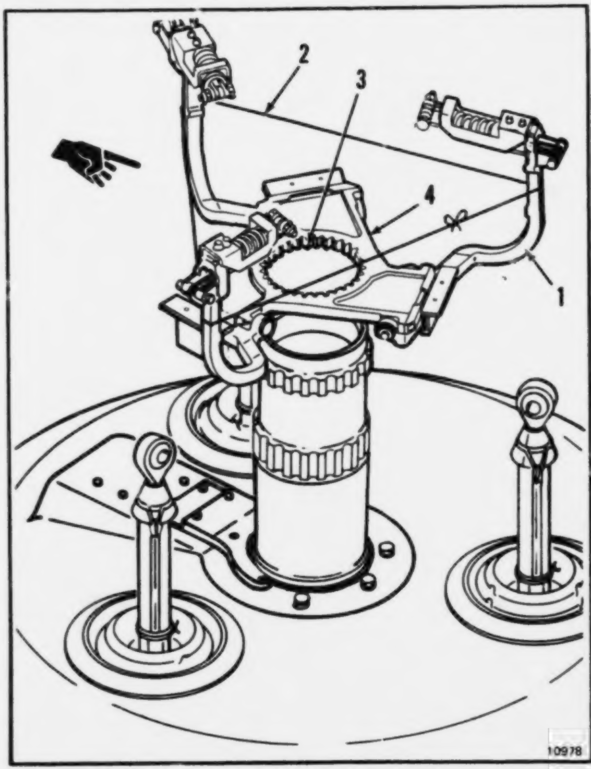
References:

TM 55-1520-240-23P

Task 5-9



1. Tie three balancing arms (1) together. Use twine (E433) (2).
2. Apply grease (E190) to splines (3) of mounting plate (4). Wipe excess grease from top and bottom of plate. Use cloth (E120). Wear gloves (E186).



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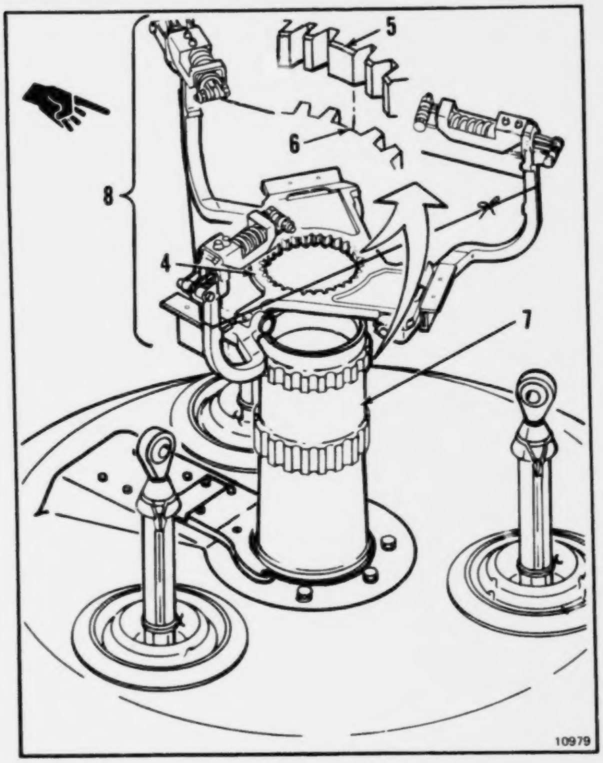
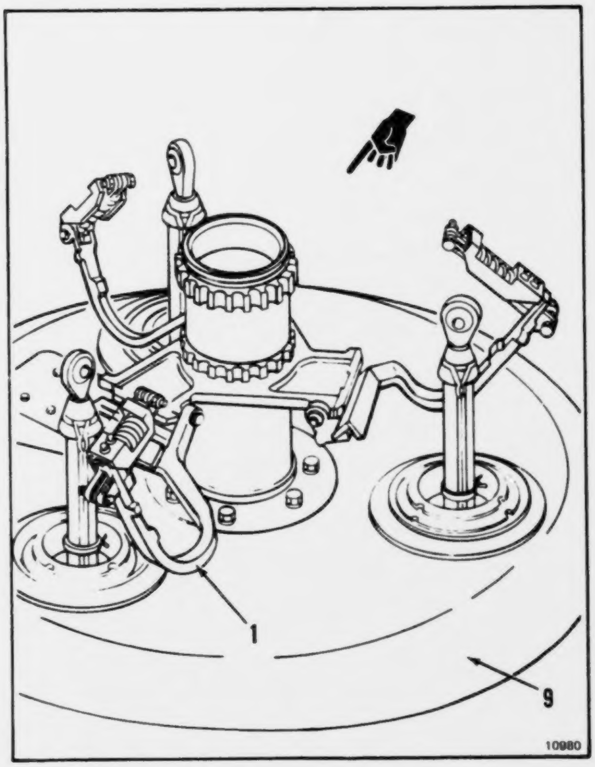
3. Align master spline (5) on mounting plate (4) with master spline (6) on drive shaft (7).
4. **Install centrifugal droop stop (8)** on drive shaft (7).



CAUTION

Do not allow balancing arms to fall against weather protective cover. Damage to cover can occur.

5. Untie balancing arms (1). Carefully lower arms until arms rest against cover (9).



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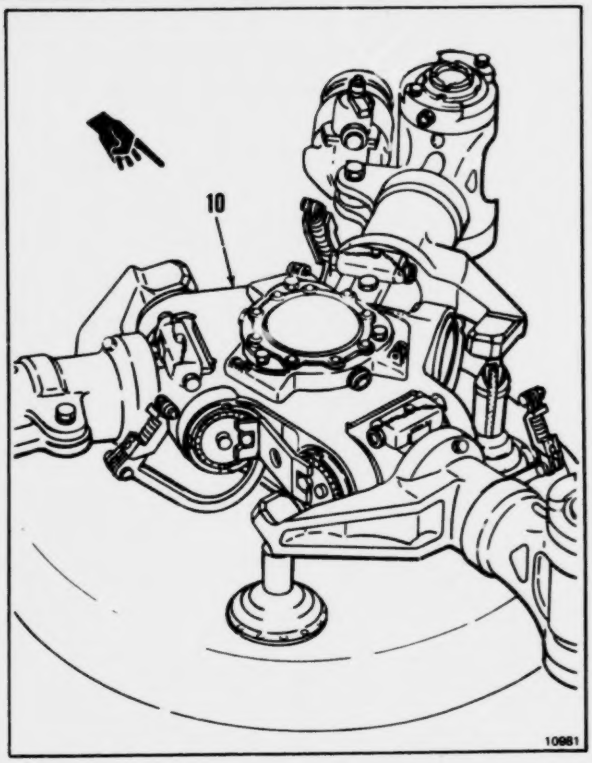
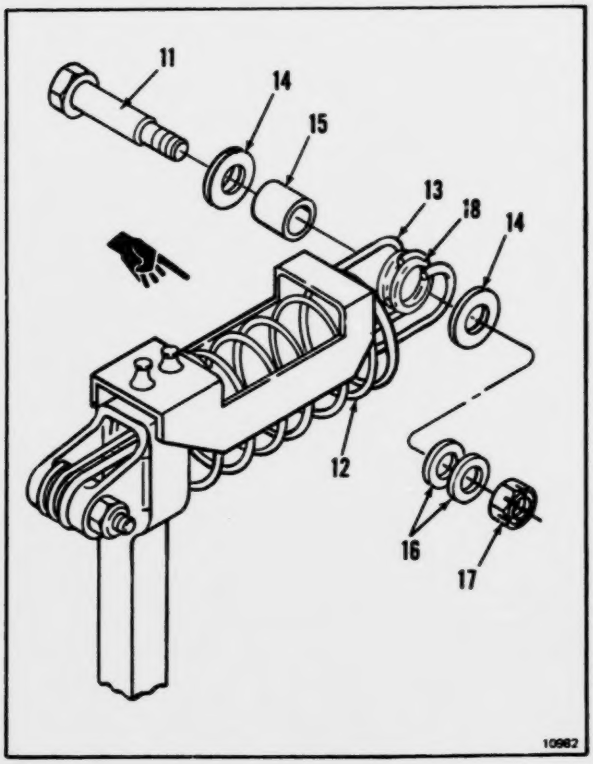
5-55 INSTALL CENTRIFUGAL DROOP STOPS (Continued) 5-55

6. **Install rotary-wing head (10)** (Task 5-9).



7. Remove bolt (11) from extension spring (12), limiter spring (13), two washers (14), bearing (15), two washers (16), and nut (17).
8. Check that grommet (18) is in spring (12).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10982

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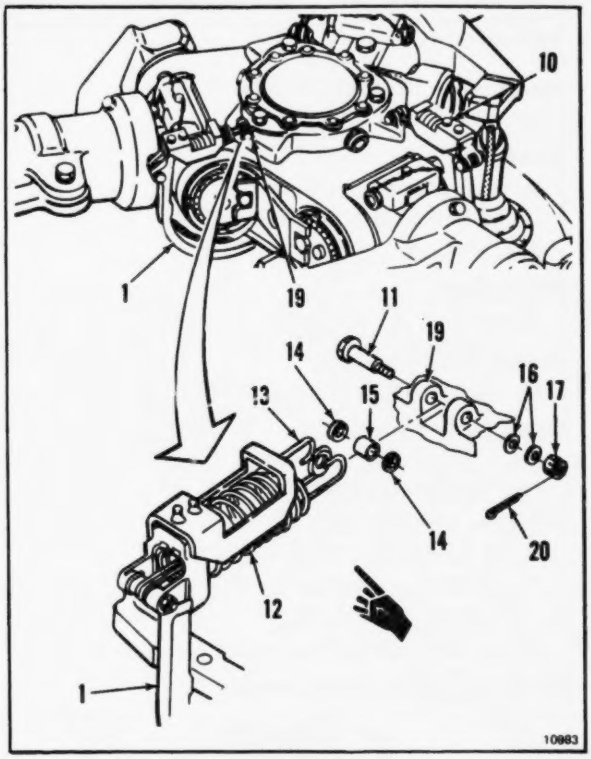
5-55 INSTALL CENTRIFUGAL DROOP STOPS (Continued) 5-55

9. **Align bearing (15), extension spring (12) two washers (14), and limiter spring (13).** Maintain alignment of these parts, lift balancing arm (3), and extend spring to **position parts between lugs (19).**
10. **Install bolt (11)** with bolt head toward rotary-wing head (10). Install washers (16), nut (17), and cotter pin (20). **Torque nut to 14 inch-pounds.** Add washers as required to align cotter pin.
11. **Repeat steps 8 thru 10 to connect remaining two balancing arms (1).**

INSPECT



FOLLOW-ON MAINTENANCE:

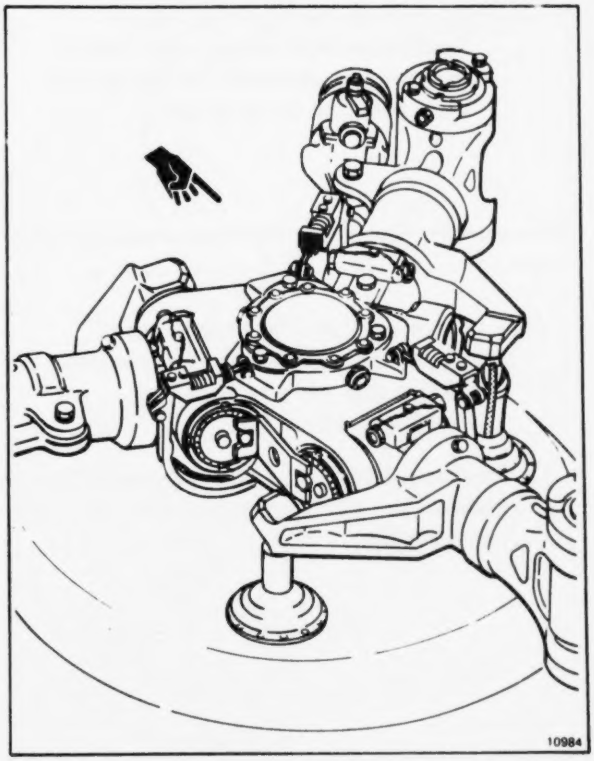
Check spring-back adjustment (Task 5-49).

Install droop stop shrouds (Task 5-48.5).

Install rotary-wing blades (Task 5-84).

Install rotary-wing shock absorbers (Task 5-93).

Close work platforms (Task 2-2).



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5-56 REMOVE CENTRIFUGAL DROOP STOP SPRINGS AND WEIGHTS 5-56

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Plier Wrench

Materials:

None

Personnel Required:

Medium Helicopter Repairer (5)

Equipment Condition:

Battery Disconnected (Task 1-39)

Electrical Power Off

Hydraulic Power Off

Pylon Workstand Open (Task 2-2)

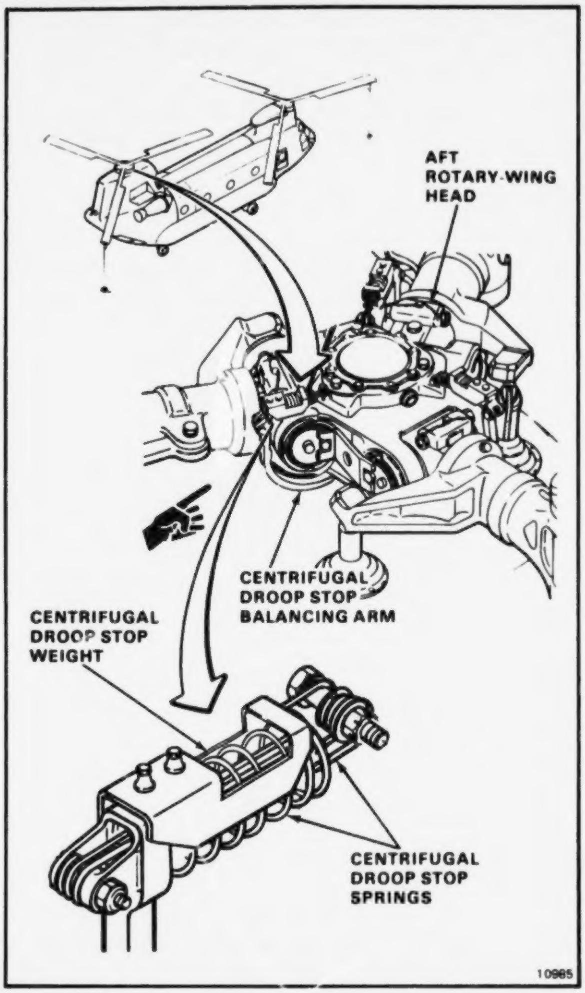
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)

Droop Stop Shroud Removed (Task 5-48.3)

General Safety Instructions:

WARNING

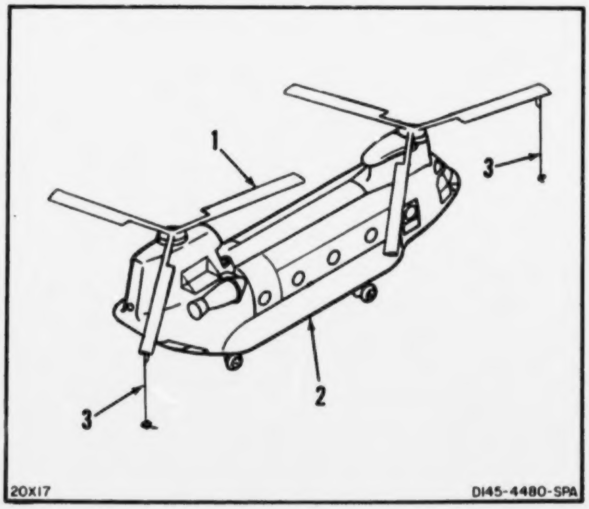
Do not lower blade suddenly. Personnel can be injured if blade is lowered suddenly while droop stop work is in progress.


AFT ROTARY-WING HEAD
CENTRIFUGAL DROOP STOP BALANCING ARM
CENTRIFUGAL DROOP STOP WEIGHT
CENTRIFUGAL DROOP STOP SPRINGS
10985

NOTE

There are three centrifugal droop stops. Procedure is same to remove springs and weights from any centrifugal droop stop.

1. **Position blade (1) over fuselage (2).** Use tiedown line (3). Tie down one forward and one aft blade.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5-56 REMOVE CENTRIFUGAL DROOP STOP SPRINGS AND WEIGHTS (Continued) 5-56

2. Remove cotter pin (4), nut (5), and two washers (6) from bolt (7) through lugs (8).

NOTE

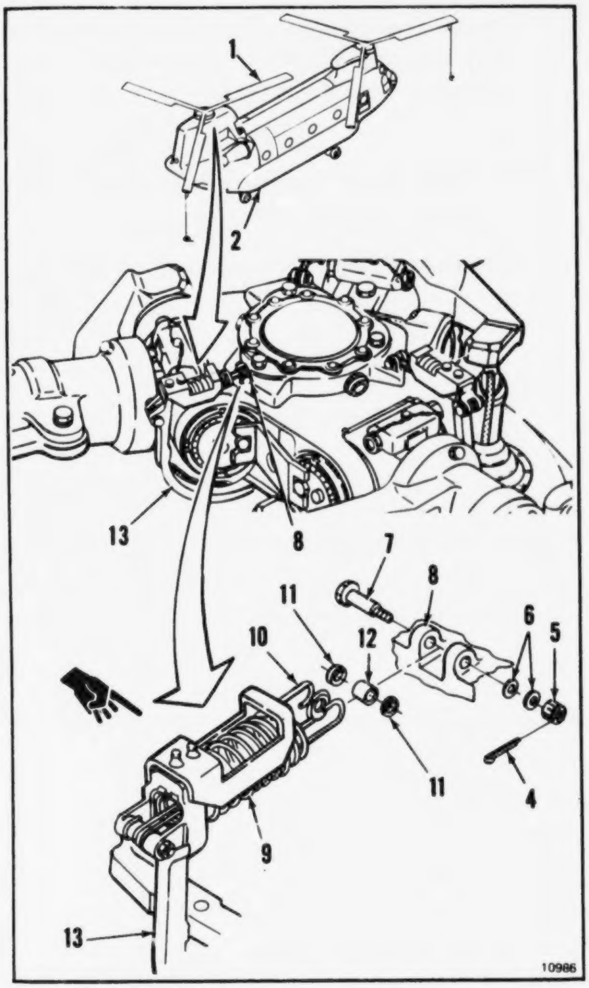
Support spring load before removing bolt. Sudden release of spring will cause small parts to fly out of lugs.

3. Support extension spring (9) and remove bolt (7). **Remove extension spring, limiter spring (10),** two washers (11), and bearing (12) from lugs (8).
4. Have helpers lift and support blade (1) at tip.
5. Lower arm (13) slowly.

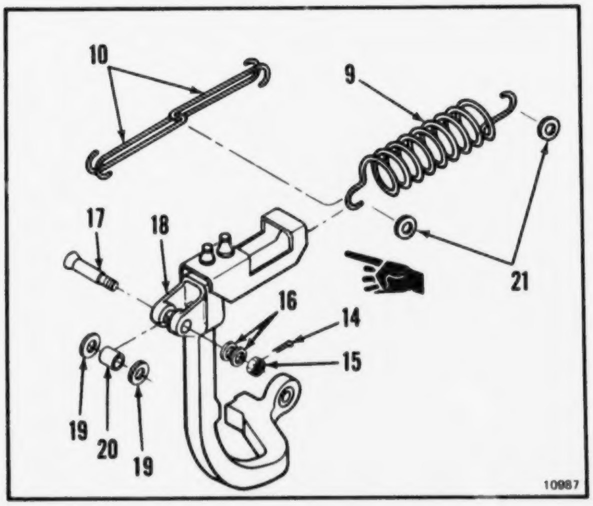
NOTE

Blade may have to be lifted higher to free balancing arm.

6. Have helpers lower blade (1) until it is at rest about 6 inches above fuselage (2).



7. Remove cotter pin (14), nut (15), and washers (16) from bolt (17) through lugs (18).
8. **Remove** bolt (17), **extension spring (9), limiter spring (10),** two washers (19), and bearing (20) from lugs (18).
9. **Remove limiter springs (10)** from extension spring (9).
10. **Remove two grommets (21)** from extension spring (9).



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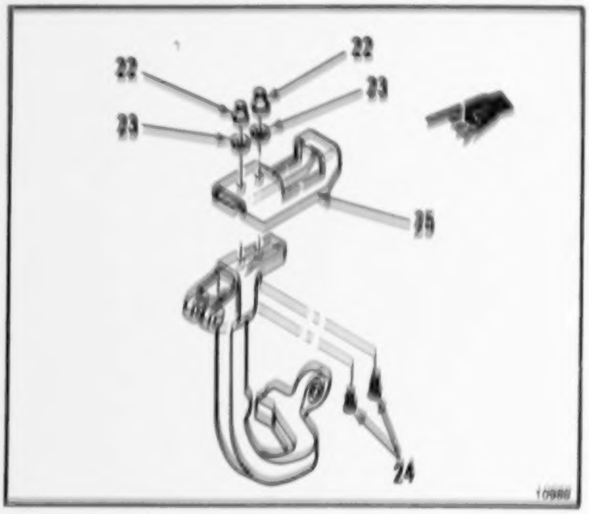
5-56 REMOVE CENTRIFUGAL DROOP STOP SPRINGS AND WEIGHTS (Continued) 5-56

11. Remove two torque collars (22) and washers (23). Use plier wrench to hold collars. Turn screws (24) with socket key.

NOTE

Droop stops may have locknuts instead of torque collars.

12. **Remove** screws (24) and **weight (25).**



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-57 INSTALL CENTRIFUGAL DROOP STOP SPRINGS AND WEIGHTS 5-57

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Torque Wrench, 5 to 50 Inch-Pounds

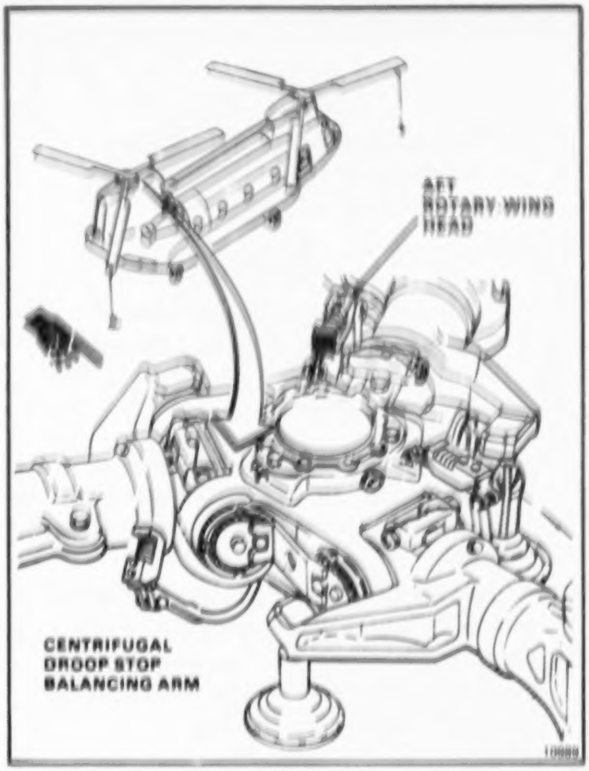
Materials:
Zinc Chromate Primer (E291)
Gloves (E186)

Parts:
Cotter Pins

Personnel Required:
Medium Helicopter Repairer (5)
Inspector

References:
TM 55-1520-240-23P

General Safety Instructions:



WARNING

Do not lower blade suddenly. Personnel can be injured if blade is lowered suddenly while droop stop work is in progress.

WARNING

Zinc chromate primer (E291) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

GO TO NEXT PAGE

5-57 INSTALL CENTRIFUGAL DROOP STOP SPRINGS AND WEIGHTS (Continued) 5-57

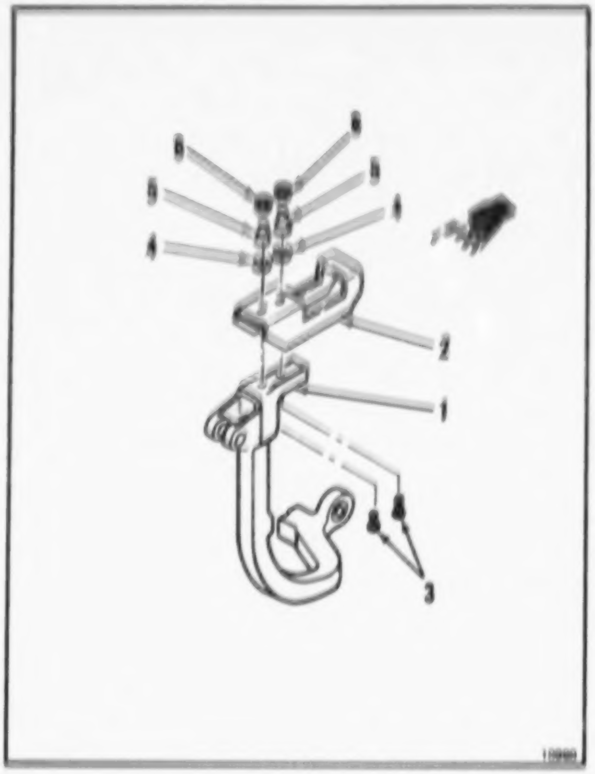
CAUTION

Do not apply zinc chromate primer (E291) to screw thread. Torque will be incorrect.

NOTE

There are three centrifugal droop stops. Procedure is same to install springs and weights on any centrifugal droop stop.

1. Prime mating surfaces of balancing arm (1) and weight (2). Prime grip of screws (3). Use zinc chromate primer (E291). Wear gloves (E186).
2. **Position weight (2) on arm (1).** While primer is wet, install screws (3), washers (4), and torque collars (5). Turn torque collars until tops (6) break off. Use screw key to prevent screws from turning.



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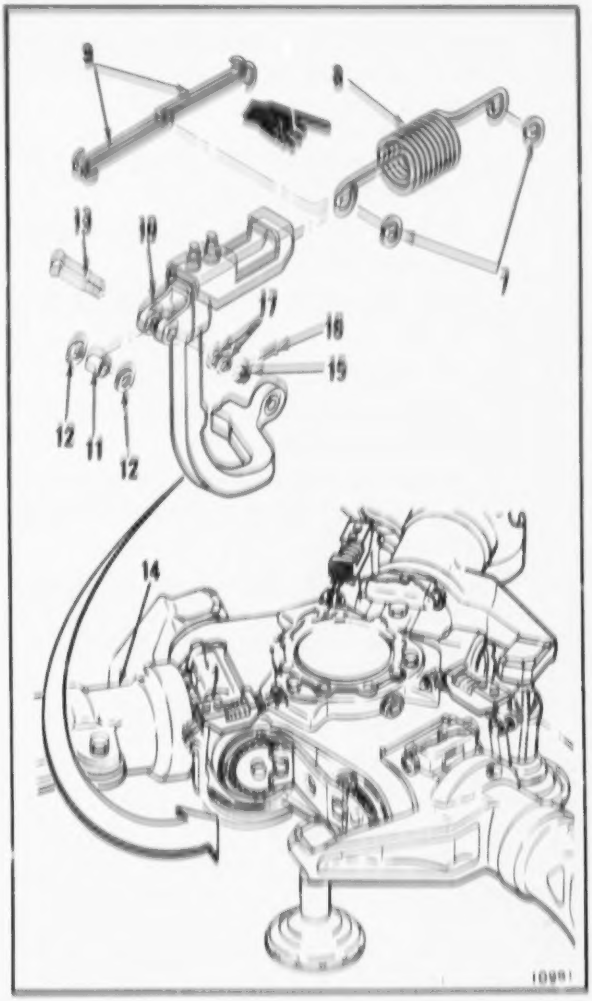
5-57 INSTALL CENTRIFUGAL DROOP STOP SPRINGS AND WEIGHTS (Continued) 5-57

3. **Install two grommets (7)** in ends of extension spring (8).
4. Hook limiter springs (9) together and **position limiter springs** in extension spring (8).
5. **Install extension spring (8) and outboard limiter spring (9)** on lugs (10) as follows:
   - a. Position bearing (11) in grommet (7) and ends of limiter spring (9).
   - b. Position two washers (12) over ends of bearing (11).
   - c. Position bearing (11) between lugs (10).
   - d. Install bolt (13), head toward pitch varying housing (14), through lugs (10) and bearing (11).
   - e. Install nut (15). **Torque nut to 12 to 15 inch-pounds.** Install cotter pin (16). Use washers (17) if needed to align cotter pin.



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5-57 INSTALL CENTRIFUGAL DROOP STOP SPRINGS AND WEIGHTS (Continued) 5-57

6. **Install extension spring (8) and inboard limiter spring (9)** on hub oil tank lugs (18) as follows:

   a. Position bearing (19) in grommet (7) and ends of limiter spring (9).

   b. Position two washers (20) over ends of bearing (19).

   c. Have helpers lift and support blade (21) at tip.

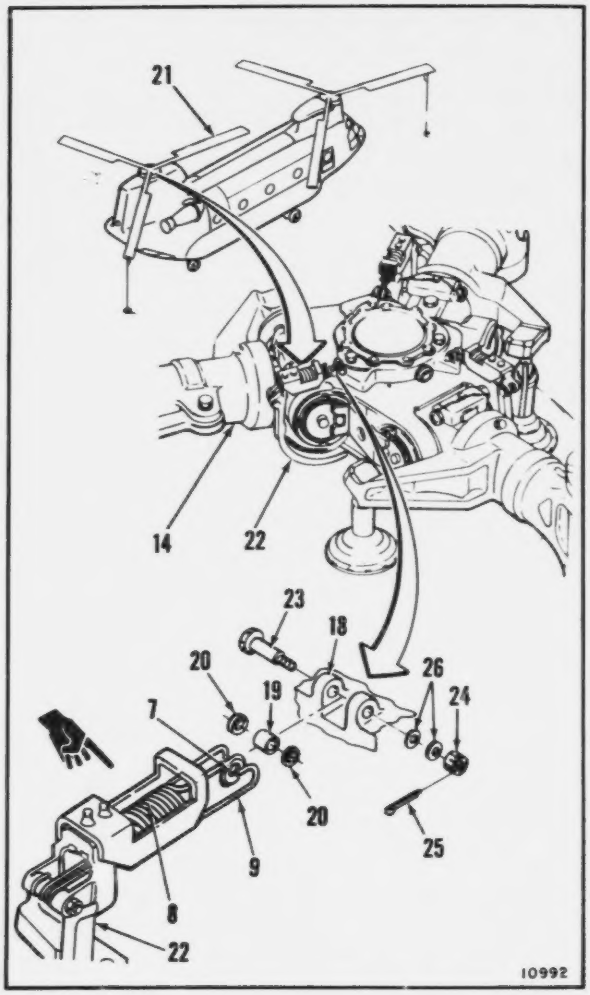
   d. Lift balancing arm (22).

   e. Extend spring (8) to position bearing (19) between lugs (18).

   f. Install bolt (23), head toward pitch varying housing (14), through lugs (18) and bearing (19).

   g. Install nut (24). **Torque nut to 12 to 15 inch-pounds.** Install cotter pin (25). Use washers (26) if needed to align cotter pin.

   h. Have helpers lower blade (21).



INSPECT

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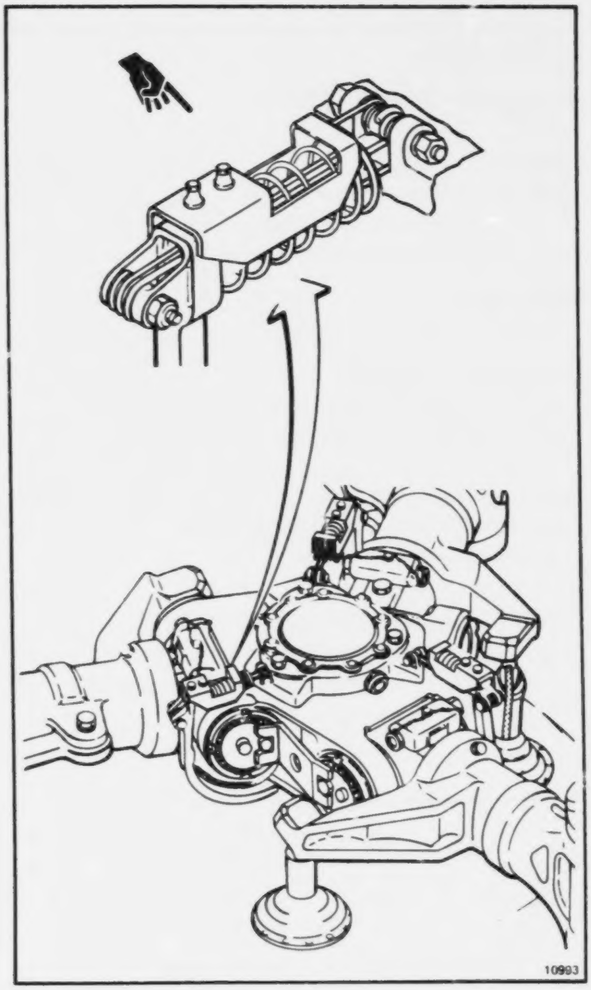
5-57 INSTALL CENTRIFUGAL DROOP STOP SPRINGS AND WEIGHTS (Continued) 5-57

FOLLOW-ON MAINTENANCE:

Install droop stop shrouds (Task 5-48.5).

Close work platform (Task 2-2).



END OF TASK

5-58 REMOVE CENTRIFUGAL DROOP STOP BALANCING ARM 5-58

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Drift, Soft Aluminum 3/4-Inch Diameter.

Materials:

None

Personnel Required:

67U10 Medium Helicopter Repairer

67U20 Medium Helicopter Repairer

Equipment Condition:

Battery Disconnected (Task 1-39)

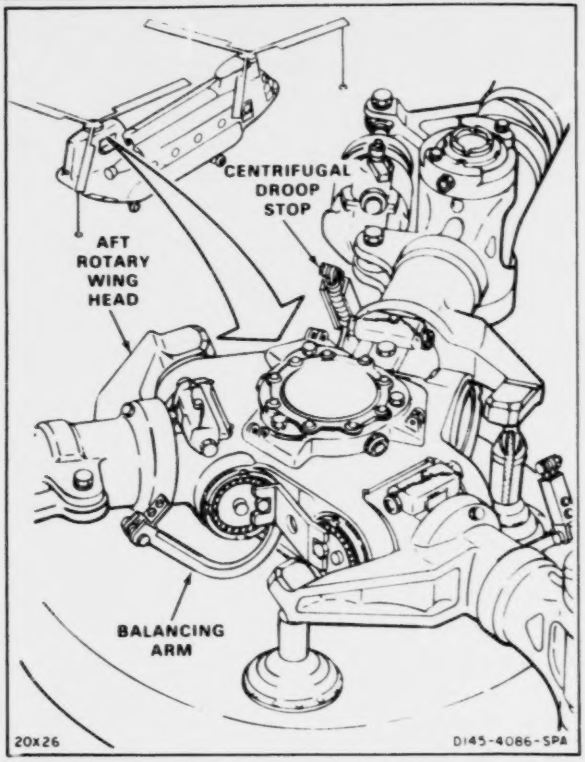
Electrical Power Off

Hydraulic Power Off

Pylon Work Platform Open (Task 2-2)

Springs and Weights Removed (Task 5-56)

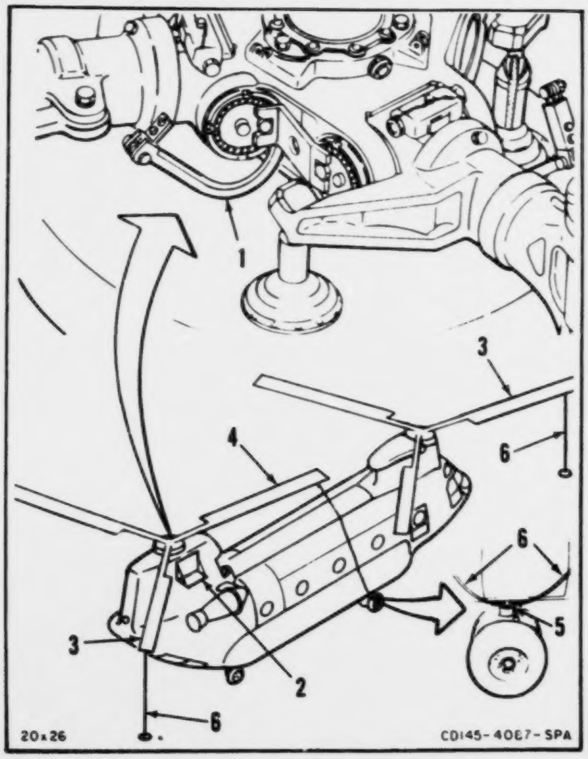
Tiedown Line Installed on One Forward and Two Aft Blades (Task 1-26)


CENTRIFUGAL DROOP STOP
AFT ROTARY WING HEAD
BALANCING ARM
20X26
D145-4086-SPA

NOTE

There are three balancing arms. Procedure is same to remove any balancing arm.

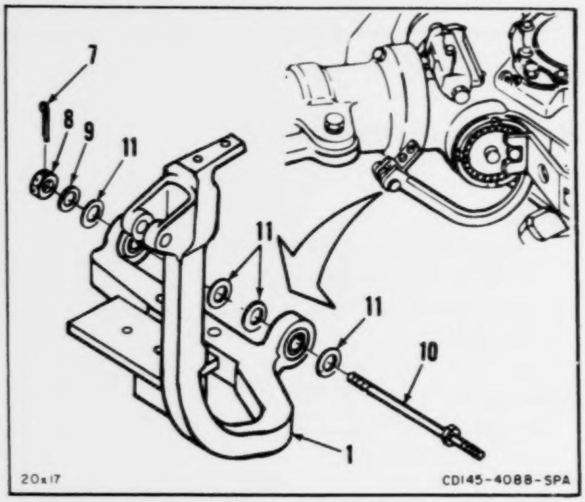
1. Position balancing arm (1) over work platform (2). Tie down two blades (3). Tie blade (4) to forward towing shackle (5). Use tiedown lines (6).


1
3
4
6
6
5
3
2
6
20x26
CD145-4087-SPA

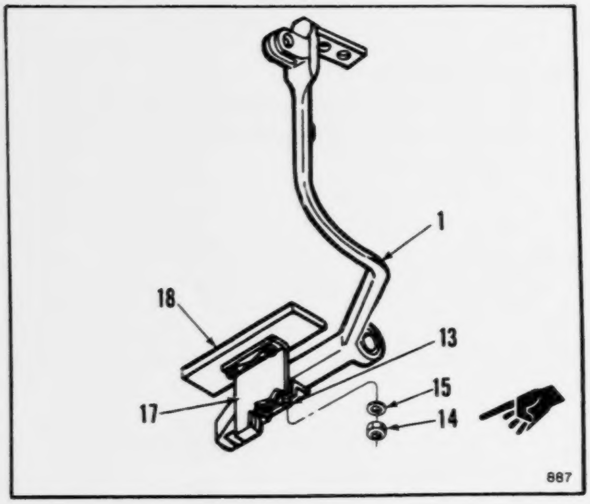
GO TO NEXT PAGE

5-58 REMOVE CENTRIFUGAL DROOP STOP BALANCING ARM (Continued) 5-58

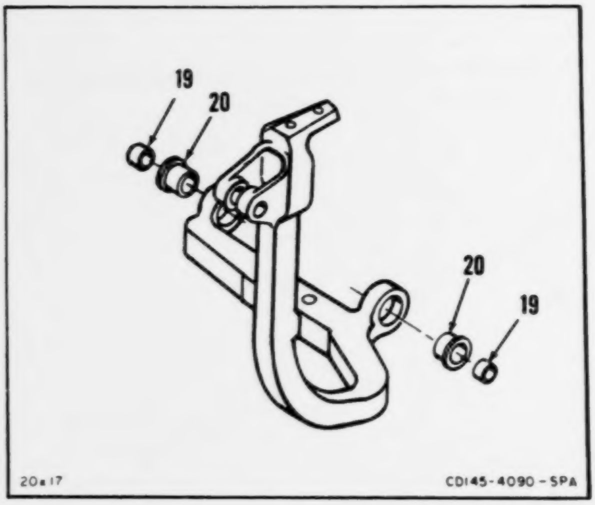
2. Remove cotter pin (7), nut (8), and washer (9).
3. Remove shaft (10) and four spacers (11). **Remove balancing arm (1).**


7
8
9
11
11
11
10
1
20x17
CD145-4088-SPA

4. **Deleted.**
5. Remove two nuts (14) and washers (15). Remove bolt (13).
6. **Deleted.**
7. **Remove interposer support (17) and interposer block (18).**


1
18
13
15
14
17
887

8. **Remove two bearings (19) and bushings (20). Use drift.**


19
20
20
19
20x17
CD145-4090-SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-59 INSTALL CENTRIFUGAL DROOP STOP BALANCING ARM 5-59

INITIAL SETUP

Applicable Configuration:
All

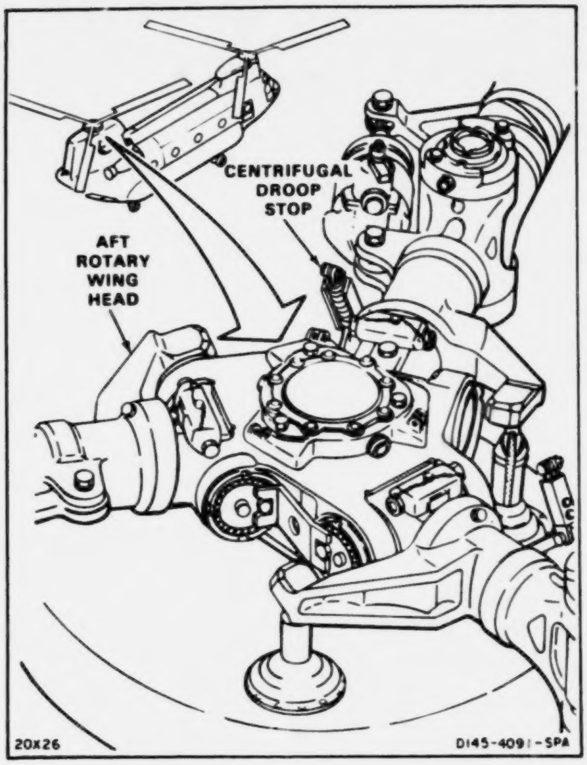
Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Torque Wrench, 30 to 150 Inch-Pounds
Drift, Brass

Materials:
Grease (E190)

Parts:
Cotter Pin

Personnel Required:
67U10 Medium Helicopter Repairer
67U20 Medium Helicopter Repairer
67U30 Inspector

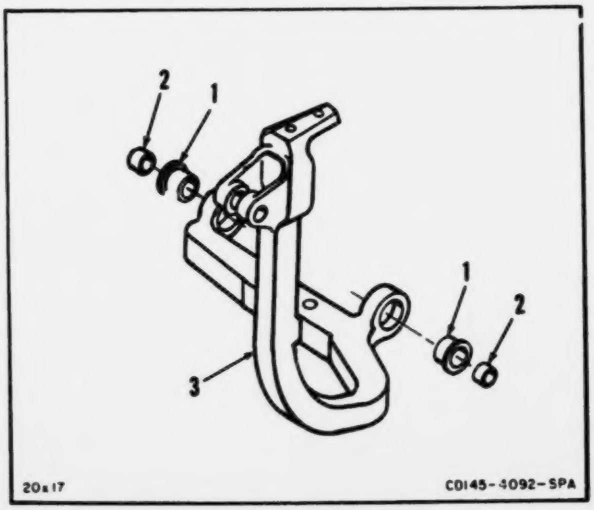
References:
TM 55-1520-240-23P


CENTRIFUGAL
DROOP
STOP
AFT
ROTARY
WING
HEAD
20X26
D145-4091-SPA

NOTE

Procedure is same to install any balancing arm.

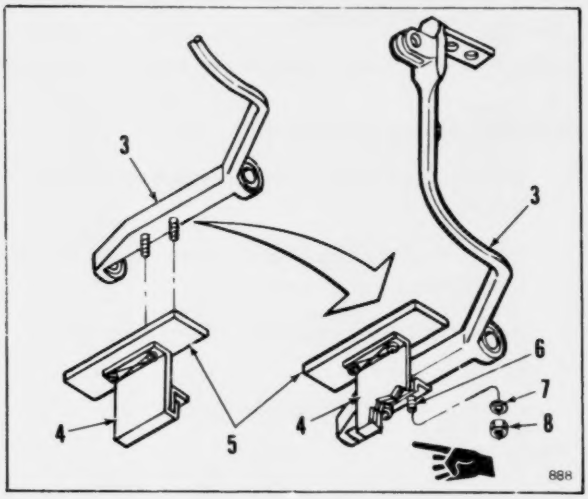
1. **Install two bushings (1) and bearings (2)** in balancing arm (3). Use drift.


2
1
1
2
3
20x17
C0145-4092-SPA

GO TO NEXT PAGE

5-59 INSTALL CENTRIFUGAL DROOP STOP BALANCING ARM (Continued) 5-59

2. **Position support (4) and interposer block (5)** on bolts (6) in balancing arm (3).
3. **Install two** washers (7) and **nuts (8)** on bolts (6).
4. **Deleted.**
5. **Deleted.**



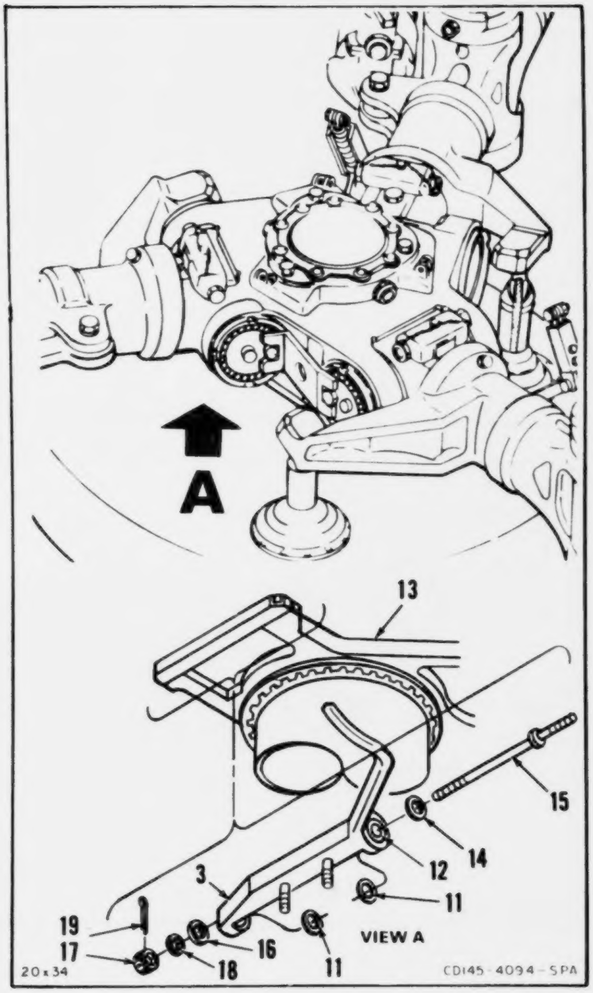
6. Apply grease (E190) to two spacers (11). Position spacers against inside surfaces of bearings (12).
7. **Position balancing arm (3) on mounting plate (13).** Move bearings (12) and spacers (11) outboard if needed.

NOTE

Hex head on shaft must face away from pitch housing.

8. Position spacer (14) on shaft (15). **Install shaft** through two bearings (12), two spacers (11), and mounting plate (13).
9. Install spacer (16) and nut (17) on shaft (15). **Torque nut to 60 inch-pounds.** Install washers (18) if needed to install cotter pin (19).
10. Install cotter pin (19).

INSPECT



GO TO NEXT PAGE

5-59 INSTALL CENTRIFUGAL DROOP STOP BALANCING ARM (Continued) 5-59

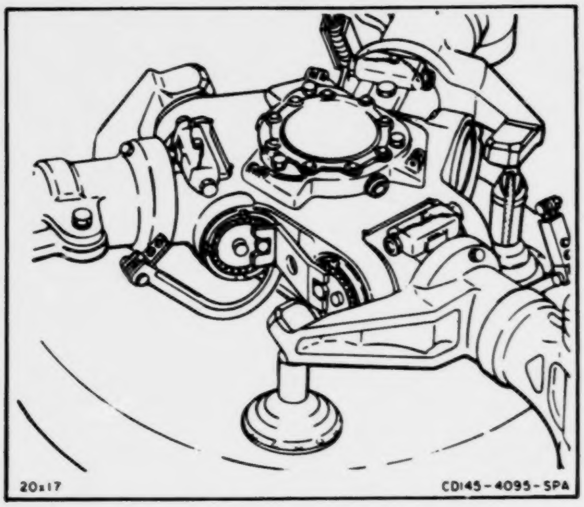
FOLLOW-ON MAINTENANCE:

Install droop stop springs and weights (Task 5-57).

Perform functional check of centrifugal droop stop (Task 5-52).

Adjust interposer support spring back (Task 5-49).

Close pylon work platform (Task 2-2).



END OF TASK

5-60 REMOVE CENTRIFUGAL DROOP STOP SUPPORT AND BLOCKS 5-60

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Drift, Aluminum or Phenolic

Materials:

None

Personnel Required:

Medium Helicopter Repairer (5)

Equipment Condition:

Battery Disconnected (Task 1-39)

Electrical Power Off

Hydraulic Power Off

Aft Pylon Work Platforms Open (Task 2-2)

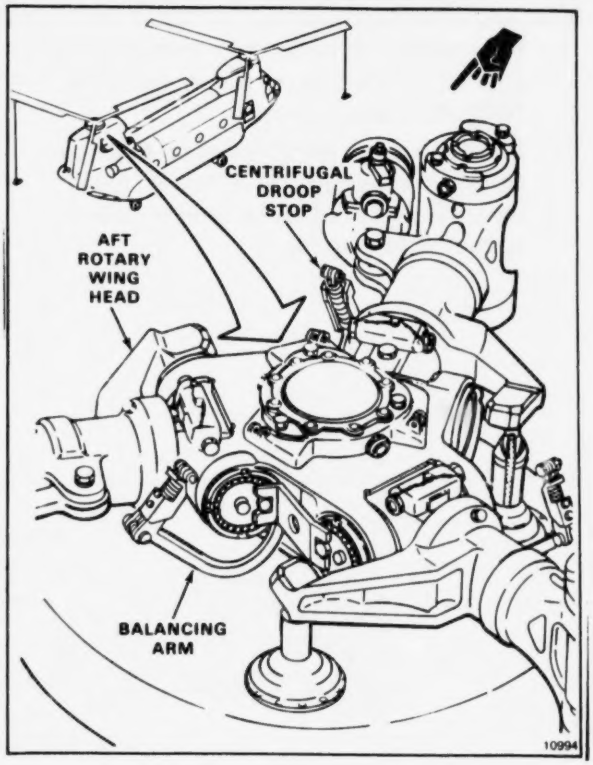
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)

Drcop Stop Shrouds Removed (Task 5-48.3).

General Safety Instructions:

WARNING

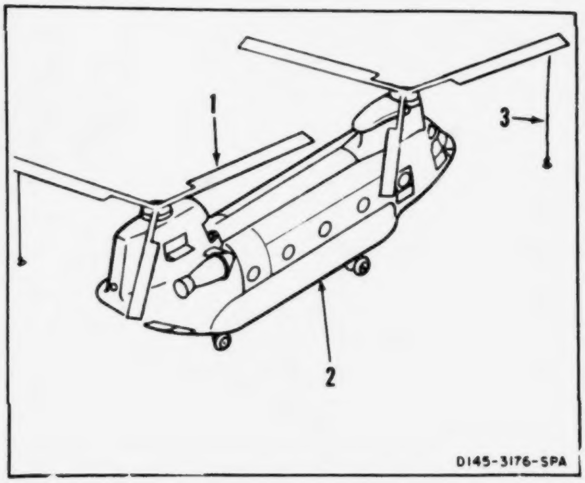
Do not lower blade suddenly. Personnel can be injured if blade is lowered suddenly while droop stop work is in progress.



NOTE

- There are three centrifugal droop stop supports and blocks.
- Procedure is same to remove any centrifugal droop stop support and blocks.
- One rotor blade is connected to support and blocks of each centrifugal droop stop.
- Blade for support and blocks to be removed must be positioned over fuselage.

1. **Position blade (1) over fuselage (2).** Use tiedown line (3). Tie down one forward and one aft blade.



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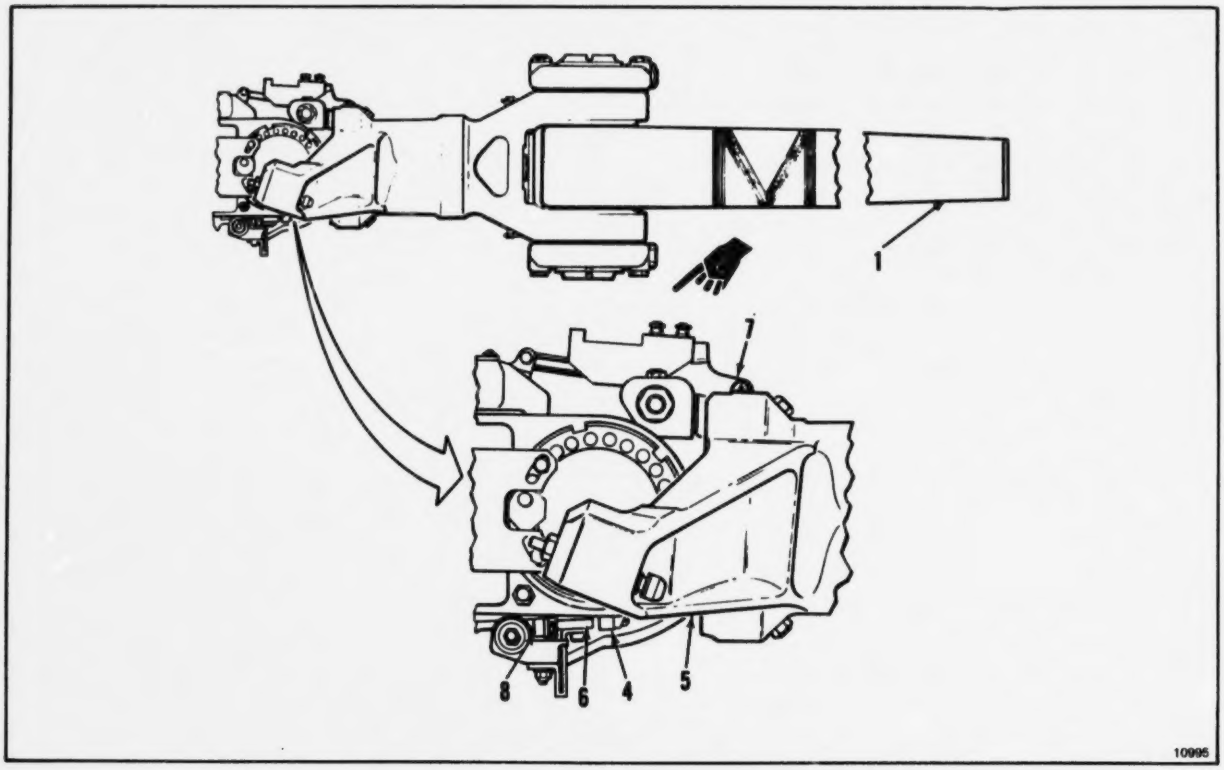
5-60 REMOVE CENTRIFUGAL DROOP STOP SUPPORT AND BLOCKS (Continued) 5-60

2. Have helpers lift blade (1) until fixed droop stop (4) on shaft (5) is clear of interposer block (6). Support blade.
3. **Pull balancing arm (7) out to clear interposer block (6).** Have helpers lower blade (1) until fixed droop stop (4) rests against flight stop (8).



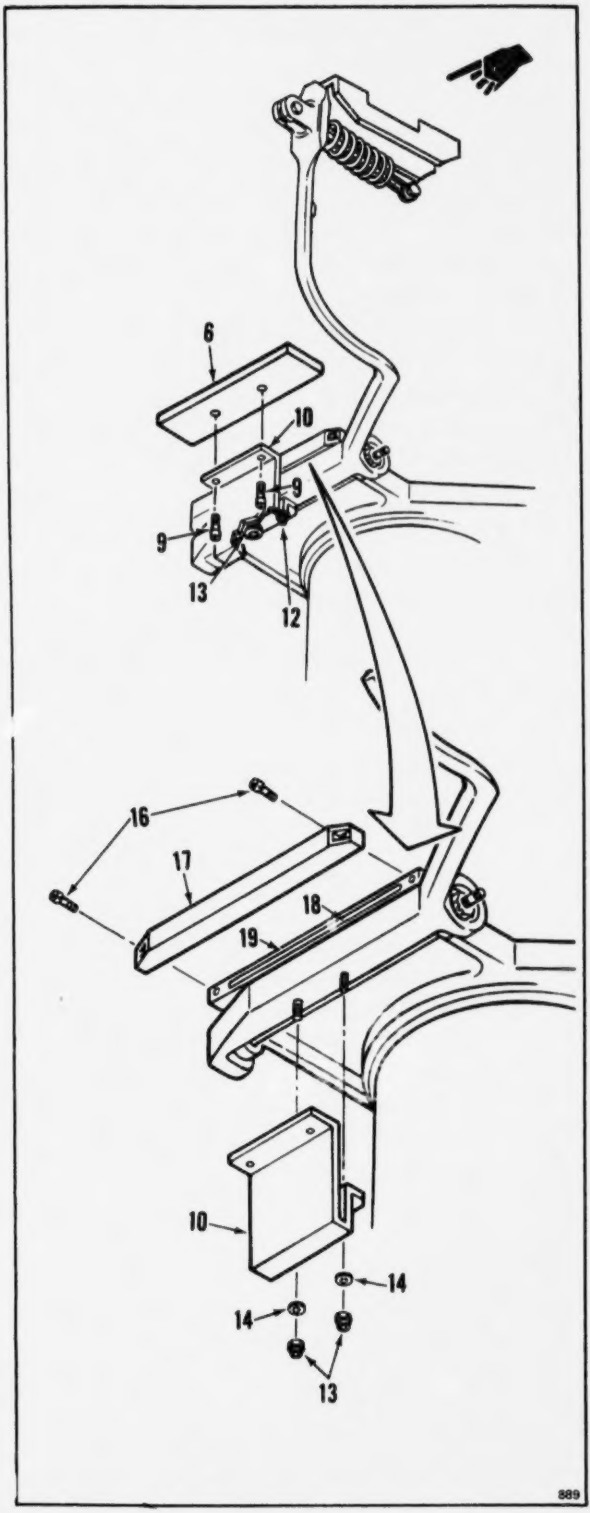
5-60 REMOVE CENTRIFUGAL DROOP STOP SUPPORT AND BLOCKS 5-60 (Continued)

4. Remove lockwire and two screws (9) from interposer block (6). **Remove interposer block.**
5. **Remove interposer support (10)** as follows:
    - a. Deleted.
    - b. Remove two locking nuts (13) and washers (14).
    - c. Deleted.
    - d. Remove interposer support (10).
6. Remove lockwire and two screws (16).

CAUTION

Striker block must be removed straight out, away from mounting plate. Striker block key can be damaged by removal in any other direction.

7. **Remove striker block (17)** straight out from keyway (18) in mounting plate (19). Tap edge of striker block from mounting-plate side. Use aluminum or phenolic drift.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-61 INSTALL CENTRIFUGAL DROOP STOP SUPPORT AND BLOCKS 5-61

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Torque Wrench, 30 to 150 Inch-Pounds

Materials:

Cloth (E120)

Lockwire (E229)

Zinc Chromate Primer (E291)

Gloves (E186)

Personnel Required:

Medium Helicopter Repairer (5)

Inspector

References:

TM 55-1520-240-23P

Task 5-49

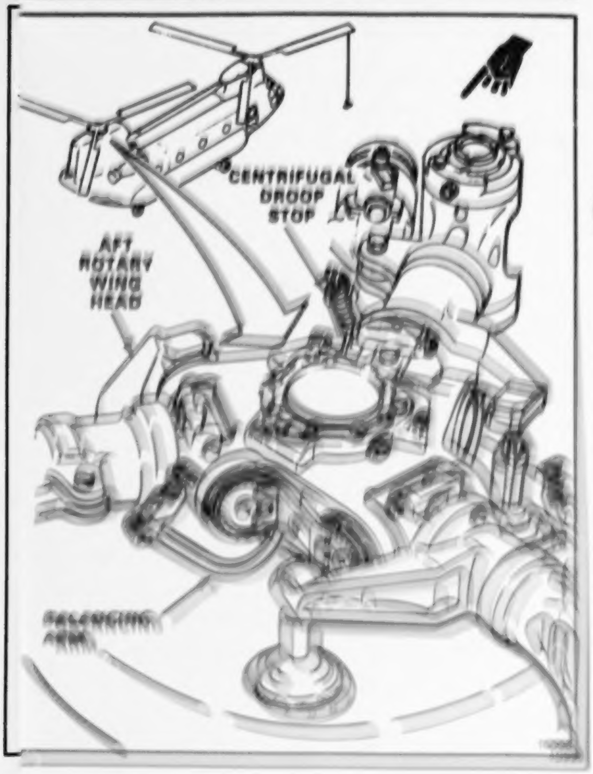
General Safety Instructions:

WARNING

Do not lower blade suddenly. Personnel can be injured if blade is lowered suddenly while droop stop work is in progress.

WARNING

Zinc chromate primer (E291) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.



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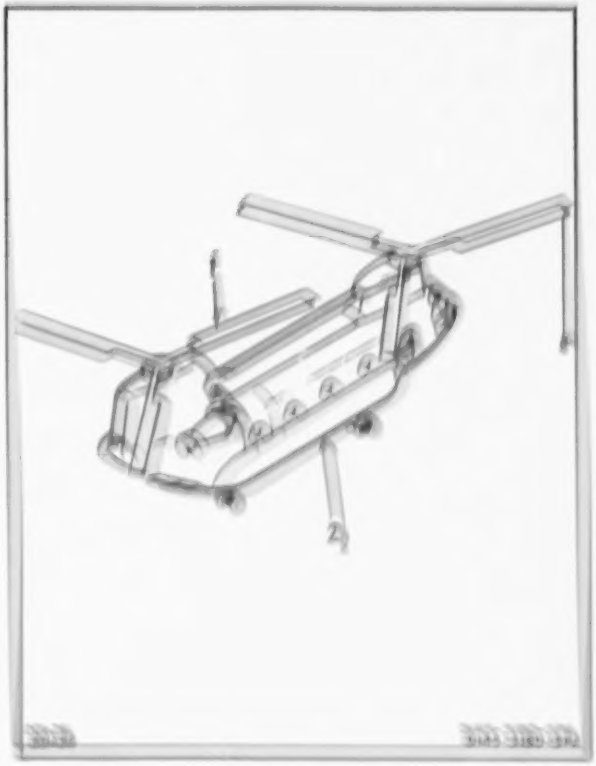
5-61 INSTALL CENTRIFUGAL DROOP STOP SUPPORT AND BLOCKS (Continued) 5-61

NOTE

- There are three centrifugal droop stop supports and blocks.
- Procedure is same to install any centrifugal droop stop support and blocks.
- One rotor blade is connected to support and blocks of each centrifugal droop stop.
- Blade for support and blocks to be installed must be positioned over fuselage.

f. Check that blade (1) is centered over fuselage (2).



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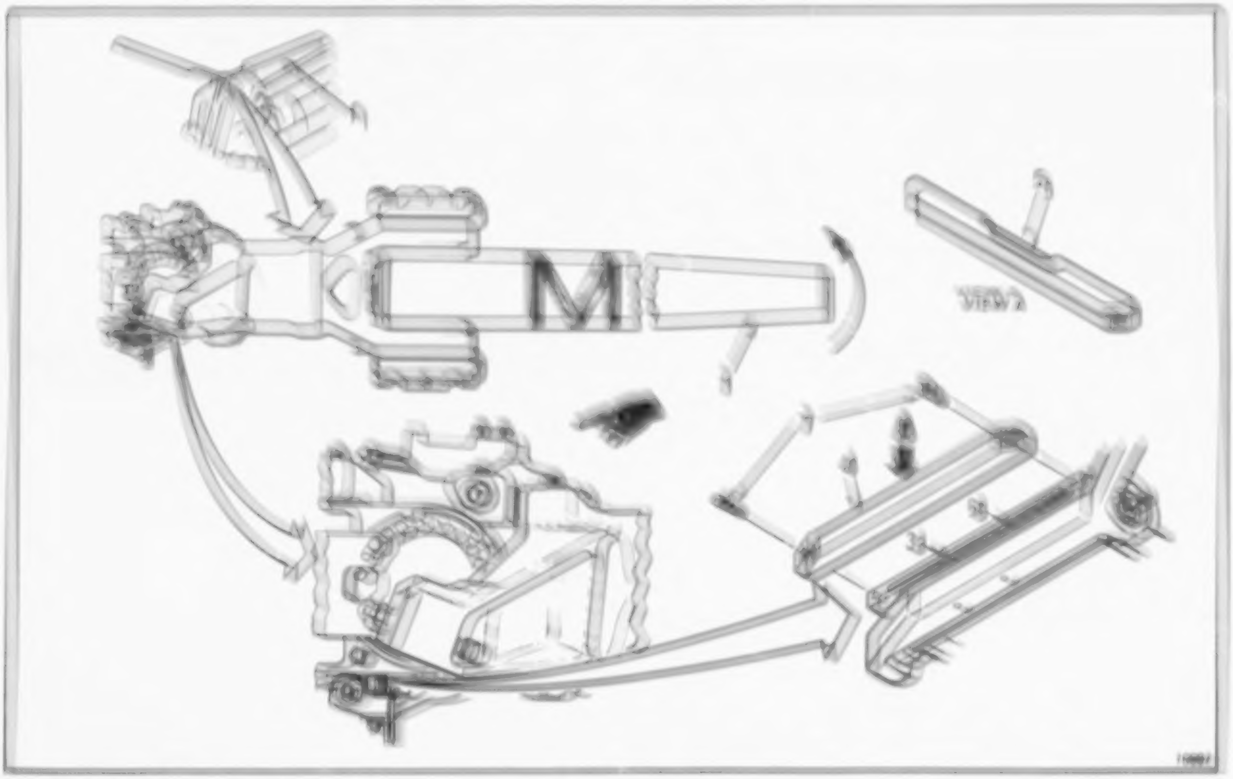
5-61 INSTALL CENTRIFUGAL DROOP STOP SUPPORT AND BLOCKS (Continued) 5-61

2. Have helpers lift and support blade (1).
3. Prime contact surfaces of mounting plate (3) and striker block (4). Use zinc chromate primer (E291). Wear gloves (E186).

NOTE

Install screws before primer dries.

4. **Position block (4),** with cutout (5) up, in keyway (6) of plate (3). **Install two screws (7). Torque screws to 70 inch-pounds**. Lockwire screws. Use lockwire (E229).



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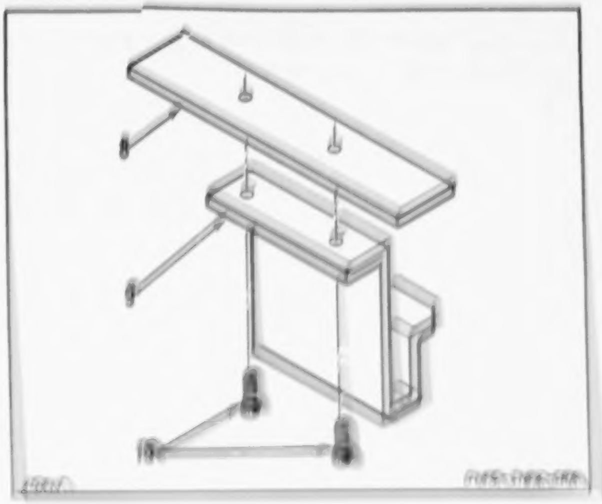
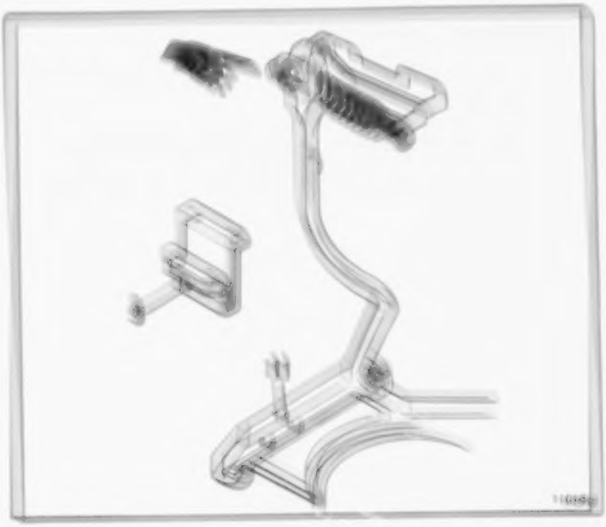
5-61 INSTALL CENTRIFUGAL DROOP STOP SUPPORT AND BLOCKS (Continued) 5-61

5. **Position interposer block (8)** on support (9). Install **two screws (10).** Lockwire screws together. Use lockwire (E229).



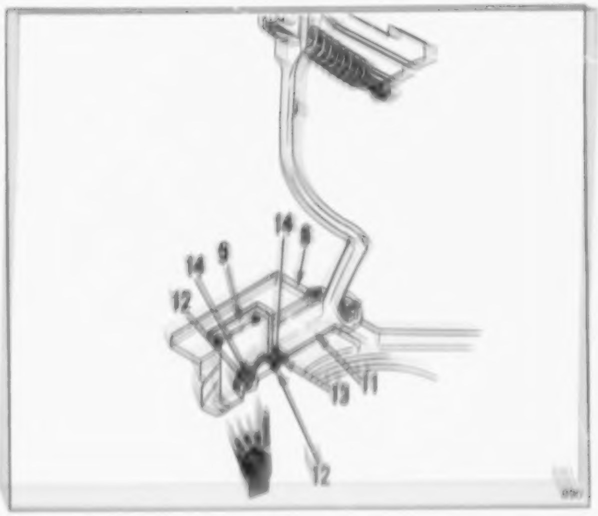


NOTE

If support is attached to arm before primer is completely dry, interposer will not spring back.

6. **Prime contact surfaces of support (9) and balancing arm (11).** Use two thin coats of zinc chromate primer (E291). Allow to dry completely. Wear gloves (E186).

7. Install interposer support (9) as follows:
   a. Position support (9) on arm (11) over two bolts (12).
   b. Install washers (13) and nuts (14). Do not tighten nuts completely.
   c. Deleted.
   d. Deleted.
   e. Deleted.



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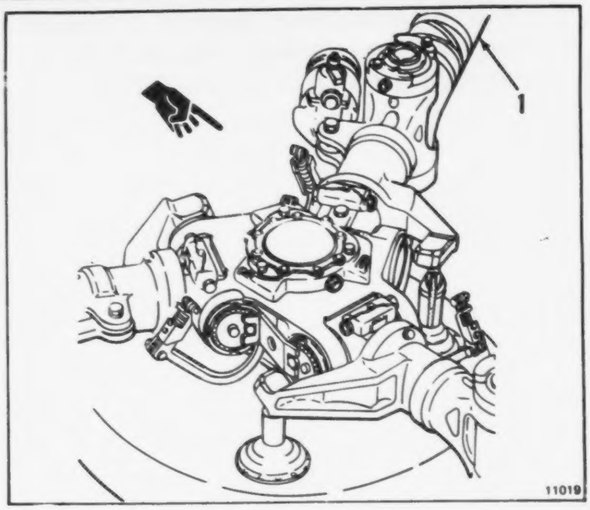
5-61 INSTALL CENTRIFUGAL DROOP STOP SUPPORT AND BLOCKS (Continued) 5-61

8. Have helpers lift blade until droop stop seats, then lower blade (1).



FOLLOW-ON MAINTENANCE:

Adjust interposer support spring-back (Task 5-49).

Install droop stop shrouds (Task 5-48.5).

Close aft pylon work platforms (Task 2-2).

END OF TASK

SECTION III

ROTARY-WING BLADES

DESCRIPTION AND OPERATION

5-62 ROTARY-WING BLADES 5-62

The rotary-wing blades are composite structures. They consist mainly of a D-shaped fiberglass spar, a titanium nose cap, and Nomex honeycomb fairing bonded to the spar. The blades are tracked and balanced using the Strobex-Vibrex system. Tracking and balancing adjustments are made by adjusting pitch links, bending the trim tab, or adding or removing tracking or balancing weights.

SPAR

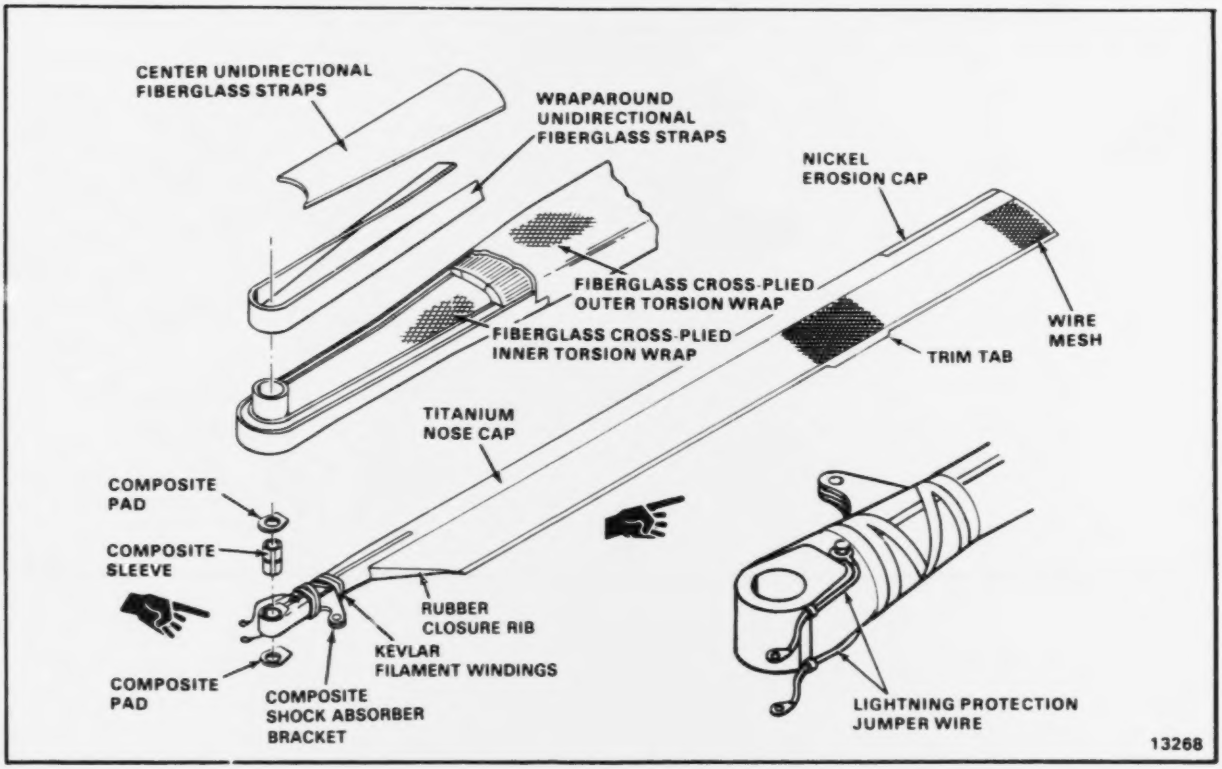
The spar is made up mainly of center and wraparound torsion straps. The wraparound straps are continuous elements. They start at the blade tip, wrap around the vertical pin bore, and return to the tip. The straps are covered by several layers of cross-ply fiberglass. These help to prevent twisting. Kevlar filament windings secure the shock absorber bracket to the spar. A replacement composite sleeve lines the vertical pin bore. The nose of the spar is formed around a permanent balance weight. Tubes are provided at the tip end of the spar for tracking weights.

LEADING EDGE

The titanium leading edge is bonded to the spar. A nickel erosion cap is bonded over the outboard 54 inches of the titanium cap. The replaceable erosion cap protects that part of the blade most easily damaged by the elements.

FAIRING

The fairing is a Nomex honeycomb core covered by laminated cross-ply fiberglass skin. Core and skin are bonded to the spar at the leading edge of the core. A wedge of fiberglass reinforces the core along its entire trailing edge. Lightning protection is provided by wire mesh positioned at intervals within the skin. The fairing is closed by a rubber rib at the inboard end and sealant at the tip end.


CENTER UNIDIRECTIONAL FIBERGLASS STRAPS
WRAPAROUND UNIDIRECTIONAL FIBERGLASS STRAPS
NICKEL EROSION CAP
FIBERGLASS CROSS-PLIED OUTER TORSION WRAP
FIBERGLASS CROSS-PLIED INNER TORSION WRAP
WIRE MESH
TRIM TAB
TITANIUM NOSE CAP
COMPOSITE PAD
COMPOSITE SLEEVE
RUBBER CLOSURE RIB
KEVLAR FILAMENT WINDINGS
COMPOSITE PAD
COMPOSITE SHOCK ABSORBER BRACKET
LIGHTNING PROTECTION JUMPER WIRE
13268

GO TO NEXT PAGE

TRACKING AND BALANCE WEIGHTS

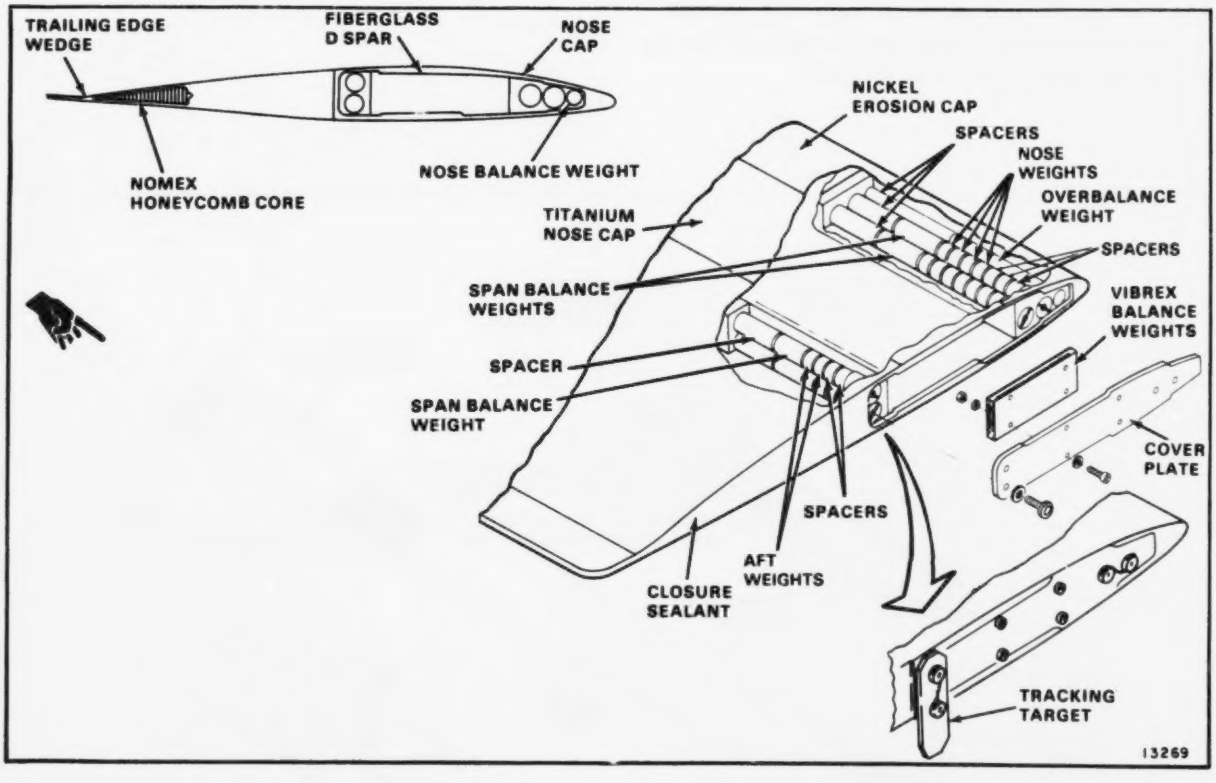
Each blade has tracking and balance weights installed in its tip. The weights are reached by removal of the cover plate. A maximum of 10 balance weights are attached to the inside of each cover plate. These weights are added or removed for Vibrex balancing requirements. The tracking weights are located in capped tubes behind the cover plate. Three tubes are in the leading edge section of the spar. Two tubes are positioned at the aft end of the spar. Weights are moved to compensate for the weight of blade repairs. Targets are installed on the cover plate before blade tracking.

TRIM TAB

The trim tab is bent at the factory to the correct angle for the blade. The bend angle may not be changed in the field.

LIGHTNING PROTECTION

Wire mesh is installed near the surface of the skin for lightning protection. The mesh reaches to the trailing edge of the blade at the trim tab and at the tip. The mesh provides a path to the jumper wires at the top and bottom of the blade spar at the inboard end. These jumper wires are connected to the oil manifold tube on the pitch housing.


TRAILING EDGE WEDGE
FIBERGLASS D SPAR
NOSE CAP
NICKEL EROSION CAP
SPACERS
NOSE WEIGHTS
NOMEX HONEYCOMB CORE
NOSE BALANCE WEIGHT
OVERBALANCE WEIGHT
TITANIUM NOSE CAP
SPACERS
SPAN BALANCE WEIGHTS
VIBREX BALANCE WEIGHTS
SPACER
SPAN BALANCE WEIGHT
COVER PLATE
SPACERS
AFT WEIGHTS
CLOSURE SEALANT
TRACKING TARGET
13269

END OF TASK

SECTION IV

ROTARY-WING BLADES

5-63 CLEAN ROTARY-WING BLADE 5-63

INITIAL SETUP

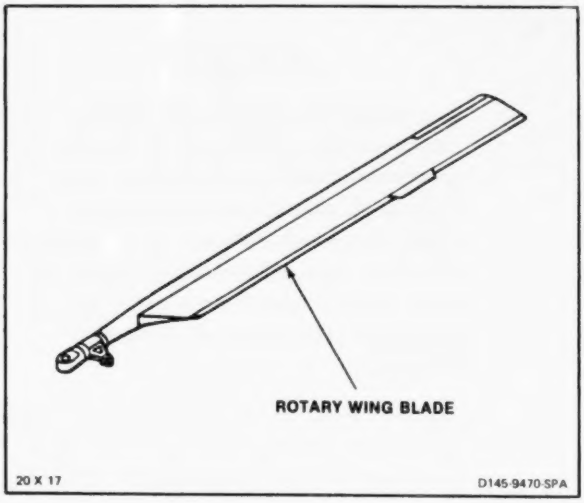
Applicable Configurations:
All

Tools:
None

Materials:
Soap (E352)
Cloth (E120)
Cloth (E128)
Solvent (E162)
Gloves (E186)

Personnel Required:
67U10 Medium Helicopter Repairer

Equipment Condition:
Off Helicopter Task



NOTE

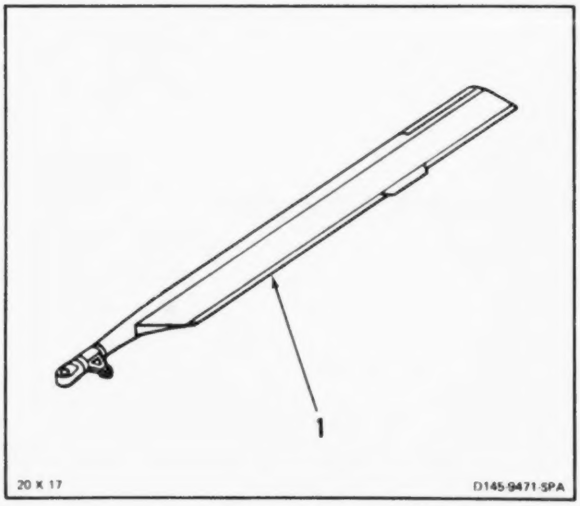
Rotary-wing blade must be cleaned before any inspection or repair. Cleaning may be done on or off helicopter.

1. **Mix soap (E352) and water** in mild solution.

CAUTION

Use only approved cleaning materials. Some solutions can damage bonded or sealed areas of blade. Dirty or gritty cloths, or compounds, can damage surfaces.

2. **Wipe surfaces of blade (1).** Use cloth (E120) soaked in soap and water solution.
3. **Rinse surfaces of blade (1).** Use clean cloth (E128) soaked in water.



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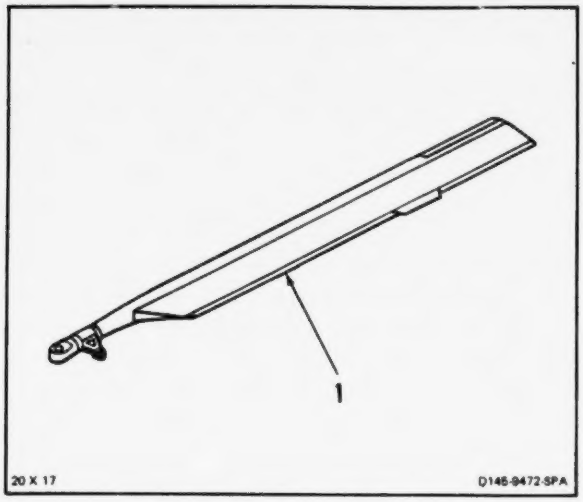
5-63 CLEAN ROTARY-WING BLADE (Continued) 5-63

4. **Dry surfaces of blade (1).** Use clean, dry cloth (E128).

WARNING

Dry cleaning solvent (E162) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

5. If soap and water solution will not clean surfaces of blade (1), use cloth (E120) damp with solvent (E162). Wear gloves (E186).

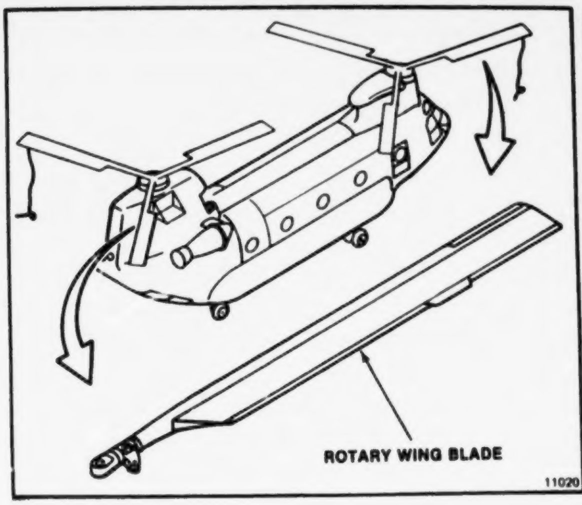


FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-63.1 ROTARY-WING BLADE SERVICEABILITY INSPECTION 5-63.1



INITIAL SETUP

Applicable Configurations:

All

Tools:

None

Materials:

Acetone (E20)
Cloth (E120)
Barrier Material (E80)
Masking Tape (E388)

Personnel Required:

Medium Helicopter Repairer (2)
Inspector

References:

Task 5-63
(As Required):
- Task 5-64
- Task 5-66
- Task 5-66.1
- Task 5-66.4
- Task 5-67.1
- Task 5-67.2
- Task 5-67.3
- Task 5-68
- Task 5-69
- Task 5-69.1
- Task 5-70
- Task 5-71
- Task 5-72
- Task 5-74
- Task 5-75
- Task 5-82
- Task 5-84

Equipment Condition:

Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line Installed as Required (Task 1-26)
Work Platform Open as Required (Task 2-2)

NOTE

Rotary-wing blades shall be cleaned prior to inspection (Task 5-63). Inspection can be performed on or off helicopter.

GO TO NEXT PAGE

5-63.1 ROTARY-WING BLADE SERVICEABILITY INSPECTION (Continued) 5-63.1

1. The following terms and definitions are used in determining serviceability of rotary-wing blades:
   a. *Bond Voids*—Open areas in which one or more layers of material are not bonded together by adhesive. Obvious bond voids appear as slightly raised surfaces, shallow air bubbles, or free edges. Other bond voids are only detect able by coin tapping.
   b. *Ply Separations*—Openings between adjacent layers of fiberglass skin. Ply separations resemble bond voids.
   c. *Score*—A blemish more severe than a scratch.
   d. *Sharp Dent*—A depression in which a definite vee can be seen or felt.
   e. *Coin Tapping*—An inspection method in which a coin or metal disk is used to detect bond voids. When tapped, a bonded area will have a sharp solid sound. Unbonded areas will give a dull thud.
   f. *Minor Damage*—Damage which does not require repair as described in step 6.
   g. *Repairable Damage*—Damage which requires repair as described in step 6.
   h. *Non-Repairable Damage*—Damage which requires repair beyond the scope of this manual. Requires replacement of rotary-wing blade.
2. **Protect the blade** around the suspected damaged area. Mask surrounding area with barrier material (E80). Secure barrier material with masking tape (E388).

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. **Remove finish** from suspected damaged area. Use cloth (E120) damp with acetone (E20). Wipe with clean dry cloth (E120). Repeat as required.
4. **Examine** areas having a contrasting lighter color. Lighter color indicates unbonding or ply separation.
5. If damage is found, repair blade as directed in step 6. If no damage is found, go to step (7).

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5-63.1 ROTARY-WING BLADE SERVICEABILITY INSPECTION (Continued) 5-63.1

6. **Determine damage limits** and repair procedure from the following table:

COMPONENT	DAMAGE	REPAIR
Spar Root End	Resin cracks	Fill with adhesive (Task 5-67)
	Holes	Replace blade (Task 5-64 and 5-84)
	Slot sealant	Replace seal (Task 5-66.4)
	Gouges, other damage. Refer to Task 67.1 for limits	Fill with glass cloth and adhesive (Task 67.1)
Titanium Leading Edge (Nose Cap)	Indentations	No repair required in absence of unbonding
	Unbonding (edge bond intact)	No repair required
	Unbonding of edge	Bond with adhesive (Task 5-66.1)
	Cracks	Repair cracks (Task 5-66.1)
	Nicks and scratches	No repair required
	Holes	Replace blade (Task 5-64 and 5-84)
Nickel Erosion Cap	Dents, erosion, nicks, scratches	No repair required
	Unbonding (edge bond intact)	No repair required
	Unbonding of edge	Bond with adhesive (Task 5-66.1)
	Erosion of aerodynamic filler	No repair required
	Cracks with 1/16 inch or less separation or unbonding	No action required
	Cracks greater than 1/16 inch separation or unbonding	Replace cap (Task 5-66)
Fairing Skins	All categories	Reparable full-span from trailing edge of titanium nose cap to blade trailing edge—no limit size (Task 5-67.2 and 67.3)
Core—Nomex Honeycomb	All categories	Reparable—no limits on size. (Task 5-68 5-69, 5-69.1 and 5-70)

Blade Damage and Repair Criteria (Sheet 1 of 2)

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5-63.1 ROTARY-WING BLADE SERVICEABILITY INSPECTION (Continued) 5-63.1

COMPONENT	DAMAGE	REPAIR
Trailing Edge	Minor nicks, dents, and scratches	Blend out or fill with adhesive (Task 5-74)
	Major damage	Reparable. No limit on cross ply and 90° material (Task 5-72). Beyond that, replace blade (Task 5-64 and 5-84)
Tiedown Receiver	All categories	Replace receiver (Task 5-80 and 5-81)
Tip Cover	All categories	Replace tip cover (Task 5-73 and 5-74)
Trim Tab	Scratches, nicks, damaged corners, unbonding	Replace blade (Task 5-64 and 5-84)
Root End Attachment	Damaged fiberglass sleeves	Blend out small nicks and scratches
	Worn or damaged protective pads	Fill with fiberglass and adhesive.
Blade Shock Absorber Brackets	Minor nicks or scratches	Blend out (Task 5-81.5)
Shock Absorber Bracket Windings	All categories	Repair — limited to depth of 0.005 inch (Task 5-81.2)
Lightning Jumper Strips	Unbonding	Reparable (Task 5-81.3)
Wire Mesh	Corrosion	Refinish (Task 5-81.4)
Rib Closure	All categories	Repair (Task 5-76 and 5-77)

Blade Damage and Repair Criteria
(Sheet 2 of 2)

7. If finish was removed for inspection and repair is not required, refinish rotor blade (Task 5-82).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-63.2 ROTARY-WING BLADE LIGHTNING STRIKE INSPECTION 5-63.2

INITIAL SETUP

Applicable Configurations:
All

Tools:
Magnifying Glass, 10 Power Minimum

Materials:
Tape (E395)

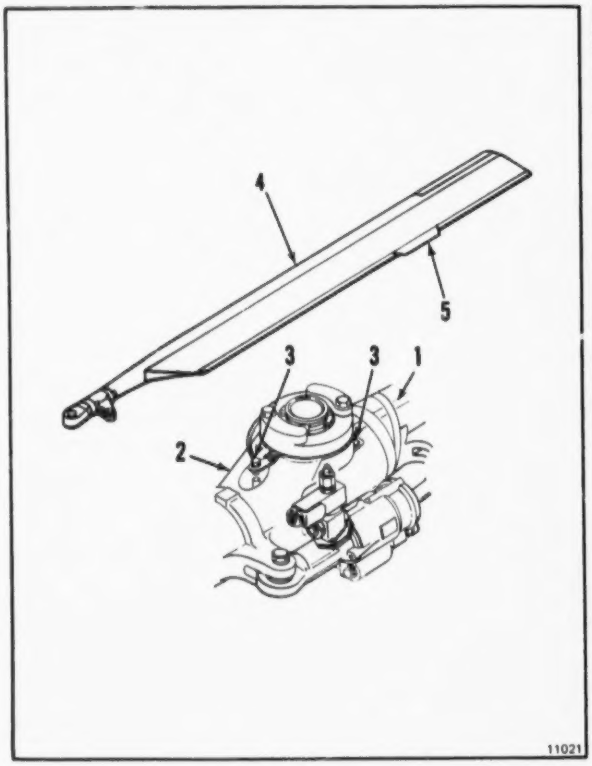
Personnel Required:
Medium Helicopter Repairer (2)
Inspector

References:
Task 5-63.1
Task 5-73
Task 5-81.3.1
Task 5-82.1
Task 5-82.4

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Blade Tiedown Ropes Installed (Task 1-26)
Work Platform Open as Required (Task 2-2)

---

1. If helicopter is struck by lightning, inspect rotary-wing blades before next flight. **Inspect blades as follows:**
    a. Visually inspect entire rotor blade upper and lower surfaces for obvious extensive damage which would prevent further flight.
    b. Using a coin, tap around burned or discolored areas for voids that exceed permissible limits (Task 5-63.1).
    c. To prevent further damage, voids or delaminations open to the airstream (forward edge) can be filled with adhesive or wrapped with fabric tape (E395). If voids are present on lightning jumper strip (1), the strip can be removed (Task 5-81.3.1).
    d. Visually inspect pitch housings (2) for burns in the area of the lightning cable connections (3). Use a magnifying glass of at least 10 power magnification.



2. Within next 20 flight hours after lightning strike, inspect rotary-wing blades as follows:
    a. Visually inspect entire blade for delamination(s), voids, and other defect(s), which may have been caused by the strike.
    b. Can tap inspect the following areas for bond voids (Task 5-63.1):
        (1) Entire area of cap nose (4).
        (2) Entire lightning strip (1), upper and lower surfaces, from inboard end of nose cap (4) at sta 77 to lightning cable connection (3) at sta 33.8.
        (3) Entire trim tab (5).
    c. Visually inspect trailing edge of nose cap (4) in areas of visual damage for cracking, pitting, etc. Use a magnifying glass of at least 10 power magnification.

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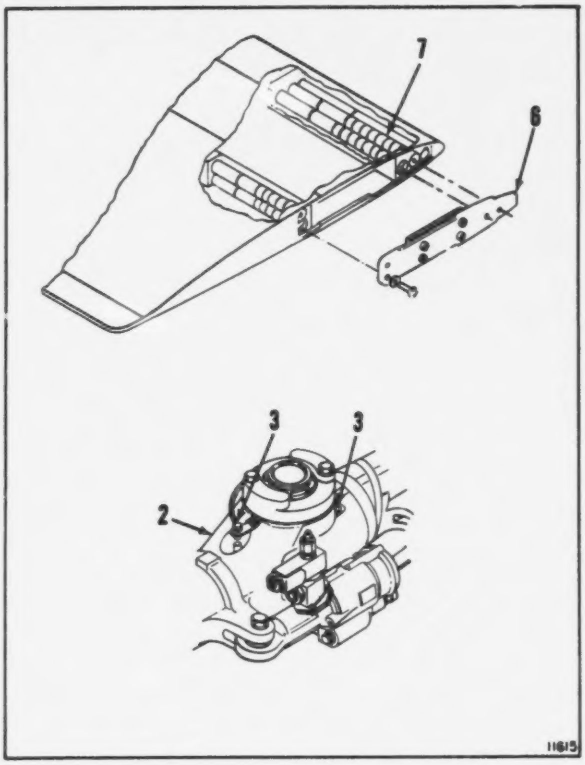
5-63.2 ROTARY-WING BLADE LIGHTNING STRIKE INSPECTION (Continued) 5-63.2

CAUTION

All hardware to be replaced in the exact reverse order as removed.

d. Remove tip cover (6) and visually inspect (Task 5-73). Remove tip hardware from aft weight fitting and visually inspect tubes (7) (Task 5-82.4). If any damage was noted on tip cover, remove tip hardware from forward weight fitting and visually inspect tubes (Task 5-82.1).

e. Visually inspect pitch housings (2) for arc burns in the areas of lightning cable connection (3) (both ends). Use a magnifying glass of at least 10 power magnification.



END OF TASK

5-63.3 INSPECT ROTOR SYSTEM AFTER EXTREME BLADE FLAPPING (SAILING) 5-63.3

INITIAL SETUP

Applicable Configurations:
All

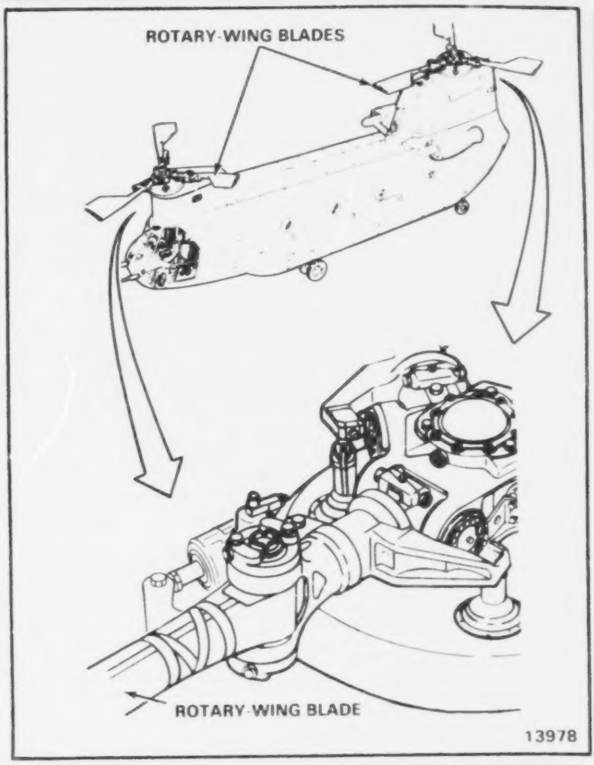
Tools:
Aircraft Mechanic Tool Kit,
NSN 5180-00-323-4692

Materials:
None

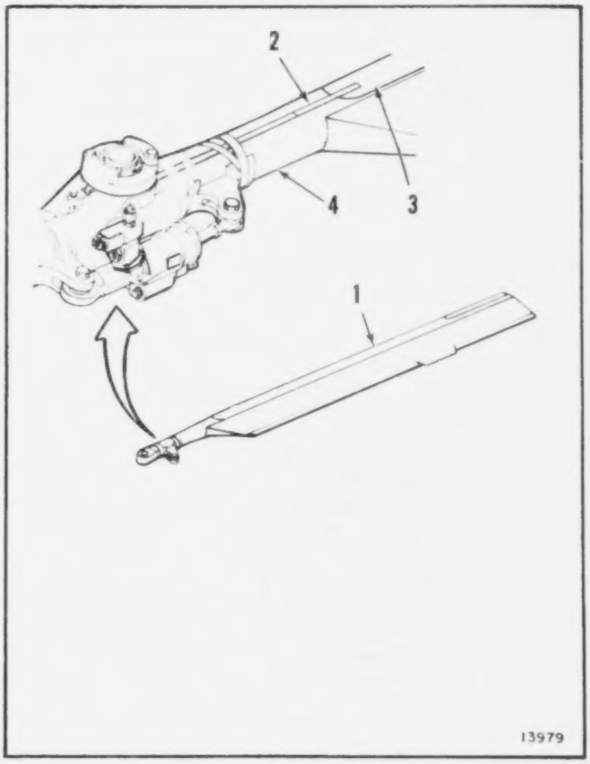
Personnel Required:
Medium Helicopter Repairer

References:
Task 5-8
Task 5-9
Task 5-64
Task 5-84
TM 55-1500-335-23

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Work Platforms Open as Required (Task 2-2)



1. **Visually inspect entire blade (1)** for obvious damage. Make a special check of the following areas:
   a. **Check jumper strip (2)** for unbonding.
   b. **Check trailing edge of nose cap (3)** along the inboard end for unbonding.
   c. **Check root end area of spar (4)** for delaminations.



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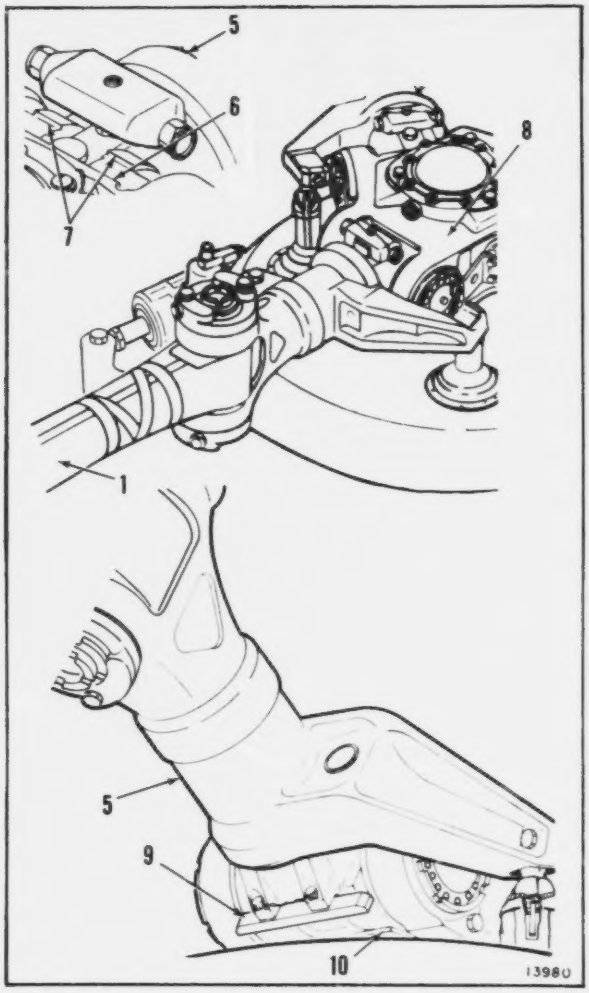
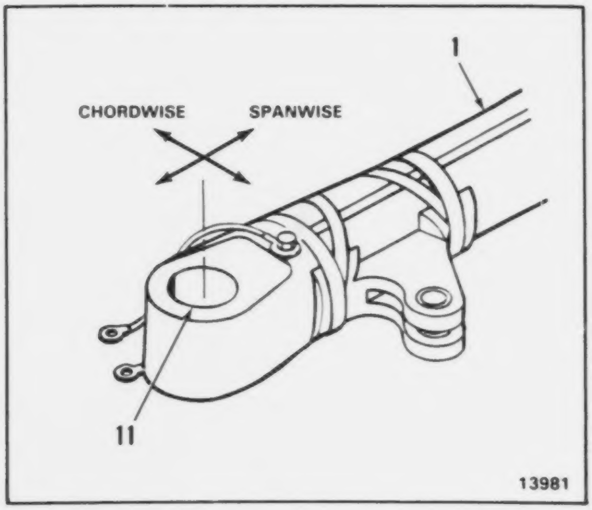
5-63.3 INSPECT ROTOR SYSTEM AFTER EXTREME BLADE FLAPPING (SAILING) (Continued) 5-63.3

2. **Check contact surfaces of pitch housing (5) and rotor head (6) as follows:**
   a. Check lugs (7) and surface (8) at each pitch housing (5) for damage.
   b. Have helpers support blade (1). Check fixed droop stop (9) and contact surface (10) at each pitch housing (5) for damage.
3. If any contact surface is broken, cracked, or deformed more than 0.050 inch, remove blade (1) at that pitch housing (5) (Task 5-64). Replace rotor head (Tasks 5-8 and 5-9).



4. **Check root end socket bore (11)** of removed blade (1) for out-of-round. Spanwise diameter shall be within 0.010 inch of chordwise diameter.
   a. If spanwise diameter is 0.010 inch or more greater than chordwise diameter, have blade ultrasonically inspected (TM 55-1500-335-23).
   b. If diameters are within 0.010 inch, install blade (1) (Task 5-84).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-64 REMOVE ROTARY-WING BLADE 5-64

INITIAL SETUP

Applicable Configurations:

All

Tools:

- Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
- Rotary-Wing Blade Sling (T35)
- Vertical Pin Puller (T79)
- Vertical Pin Reaction Adapter Set (T47)
- Torque Wrench (T48)
- Hoist
- Rope Guidelines

Materials:

- Barrier Material (E80)
- Tape (E388)
- Paper Tag (E264)

Personnel Required:

Medium Helicopter Repairer (6)

Equipment Condition:

- Battery Disconnected (Task 1-39)
- Electric Power Off
- Hydraulic Power Off
- One Forward and One Aft Blade Tied-Down (Task 1-26)
- Tiedown Lines Installed as Required (Task 1-26)
- Work Platforms Open as Required (Task 2-2)

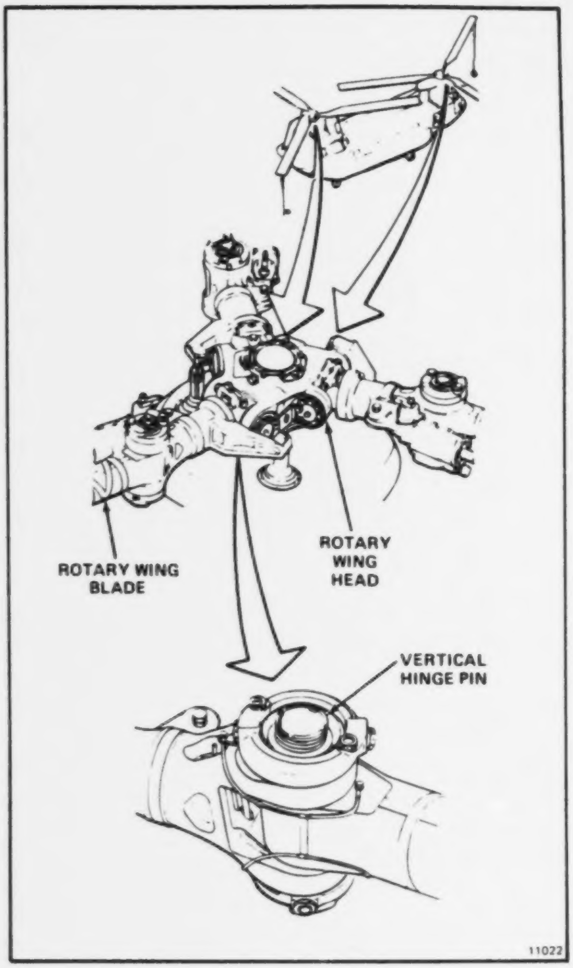
General Safety Instructions:

WARNING

Do not allow rotor head to move when blade is removed. Moving rotors can cause injury to personnel or damage to equipment.

NOTE

Prior to returning any "unserviceable" fiberglass rotor blade to depot, contact local AVSCOM Logistic Assistance Representative for assistance. The blade may be a candidate for repair on site at your location.



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5-64 REMOVE ROTARY-WING BLADE (Continued) 5-64

NOTE

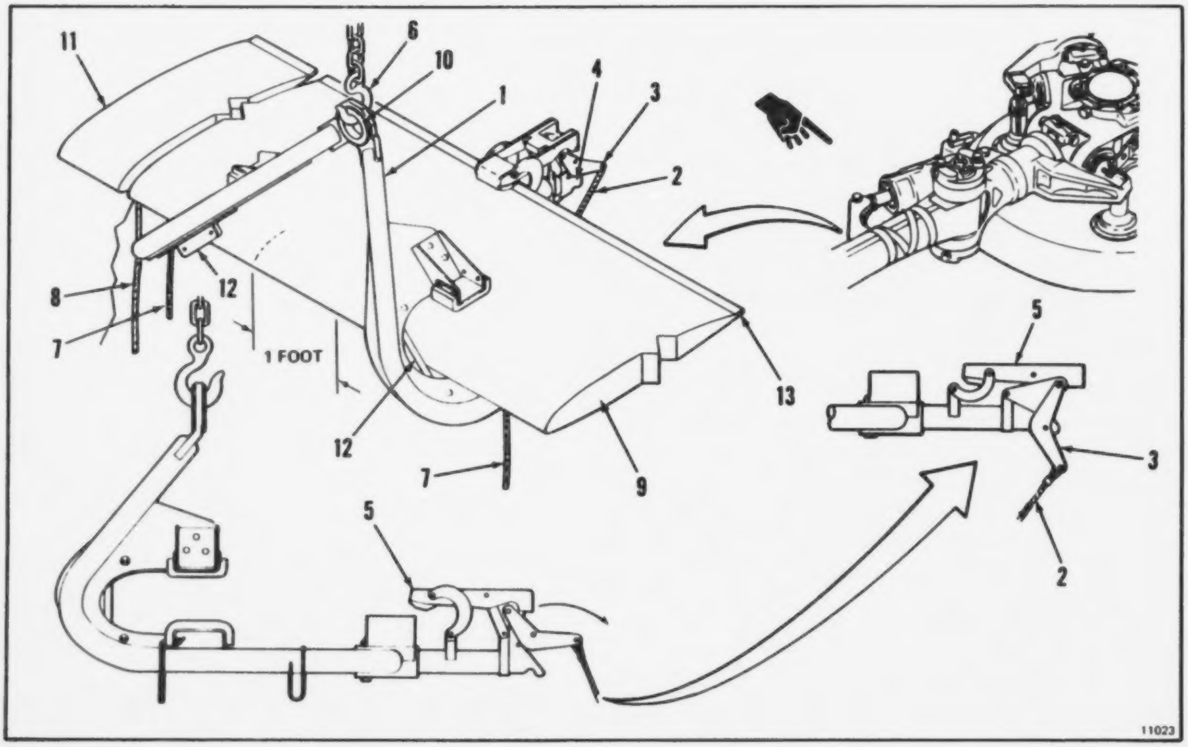
- Positive retention bolts are installed in shock absorber connections. They have a pawl which prevents nut or bolt removal unless pawl is depressed.
- Procedure is similar to remove any rotary-wing blade. Differences are noted in task. Forward blade is shown here.

1. On blade sling (T35) (1), pull release rope (2) forward until lever (3) seats in notch (4). Clamp (5) is now locked in aft position.

NOTE

- Release rope should not be used as guide when lifting and positioning sling (T35). Tension may release clamp before a sling is positioned.
- When sling is lifted without blade, clamp will be low.

2. Attach hoist (6). Lift sling (T35) (1). Use two guide lines (7) and tiedown line (8) to guide sling.
3. **If blade (9) will be installed again, position eye (10) 1 foot farther from tip (11) than marked balance point.** Go to step 5.
4. **If blade (9) will be replaced, position eye (10) at balance point.**
5. Use outboard guideline (7) to lower one side of sling (T35) (1) for blade alignment. **Pull sling onto blade (9)** until blade rests against two bumpers (12). Use two guide ropes.
6. Hold sling (T35) (1) against blade (9). Pull release rope (2) away from sling to **release clamp (5)** against blade trailing edge (13).



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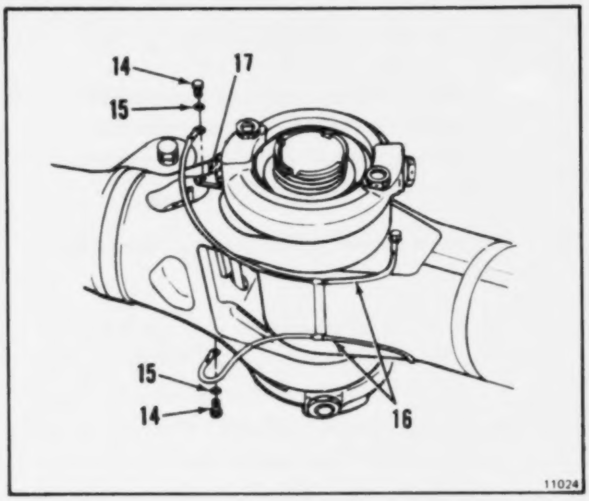
5-64 REMOVE ROTARY-WING BLADE (Continued) 5-64

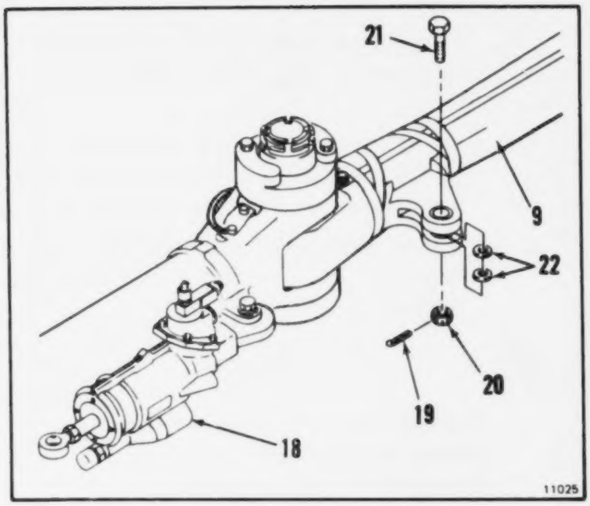
7. **Remove two** bolts (14), washers (15), and **jumper wires (16)** from oil manifold tube (17).



CAUTION

Do not leave shock absorber attached to blade. Damage to attaching bracket can occur.

8. **Disconnect shock absorber (18) from blade (9)** as follows:
   a. Remove cotter pin (19). Remove nut (20).
   b. Remove bolt (21).
   c. Remove two washers (22).
   d. Swing shock absorber (18) out and inboard.



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5-64 REMOVE ROTARY-WING BLADE (Continued) 5-64

CAUTION

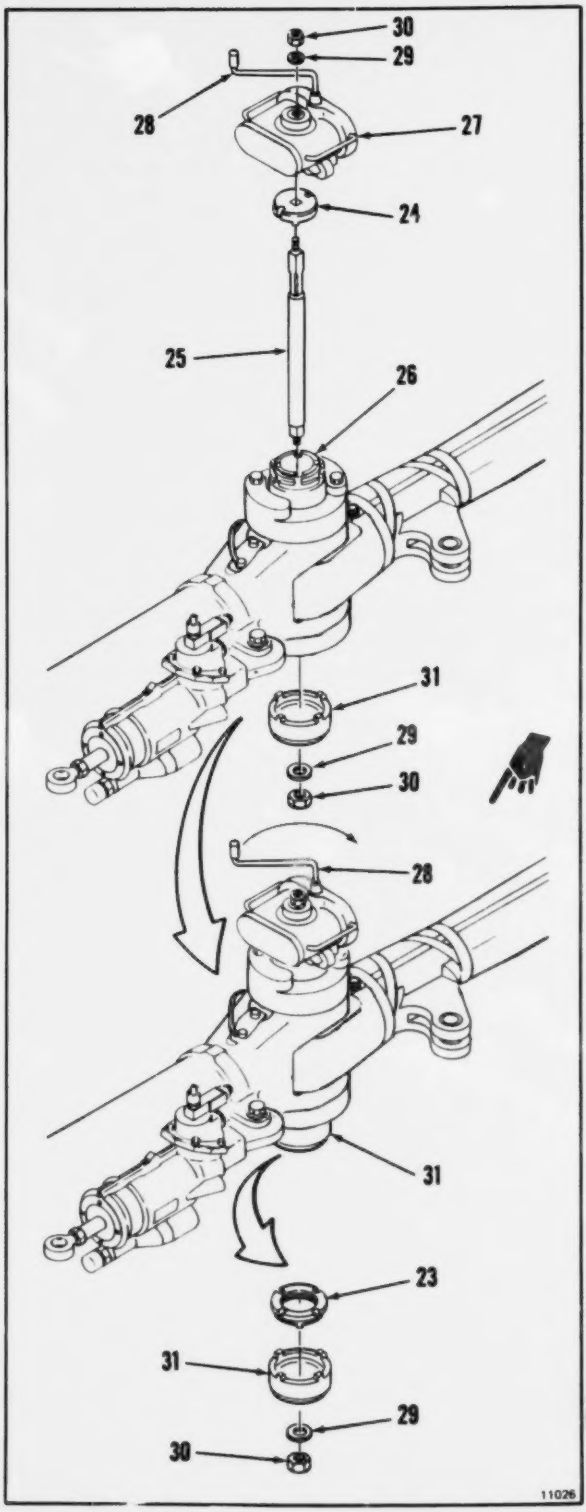
Lower vertical pin nut must be removed before upper nut. Removing upper nut first can damage pin or inner liners.

9. **Remove lower vertical pin nut (23)** as follows:
   a. Position pilot socket (24) on drive bar (25). Position drive bar through vertical pin (26). Have helper support drive bar.
   b. Install torque wrench (T48) (27) on drive bar (25). Turn handle (28) in either direction until wrench is seated on pilot socket (24).
   c. Install upper washer (29) and nut (30) on drive bar (25). Have helper release bar.
   d. Install spanner socket (31) on drive bar (25) and engage with lower pin nut (23). Install lower washer (29) and nut (30).
   e. Adjust upper ano lower nuts (30) until drive bar (25) is seated in spanner socket (31).

CAUTION

Torque wrench must not turn during removal of lower nut. Equipment can be damaged.

   f. Turn handle (28) clockwise to remove lower nut (23).
   g. Remove lower nut (30), washer (29), spanner socket (31), and lower pin nut (23).



5-64 REMOVE ROTARY-WING BLADE (Continued) 5-64

10. **Remove upper vertical pin nut (32)** as follows:

    a. Have helper support drive bar (25). Remove nut (30) and washer (29).

    b. Remove torque wrench (T48) (27).

    c. Install spanner socket (31) on drive bar (25), over pilot socket (24). Seat spanner socket on upper nut (32).

NOTE

Pilot socket can be pushed out of vertical pin notches.

    d. Have helper raise drive bar (25) slightly. Have him rotate bar until flats on bar seat in pilot socket (24). Continue to support bar.

    e. Install torque wrench (T48) (27) on drive bar (25). Turn handle (28), in either direction, until wrench is seated on spanner socket (31).

    f. Install washer (29) and nut (30) on drive bar (25). Have helper release bar.

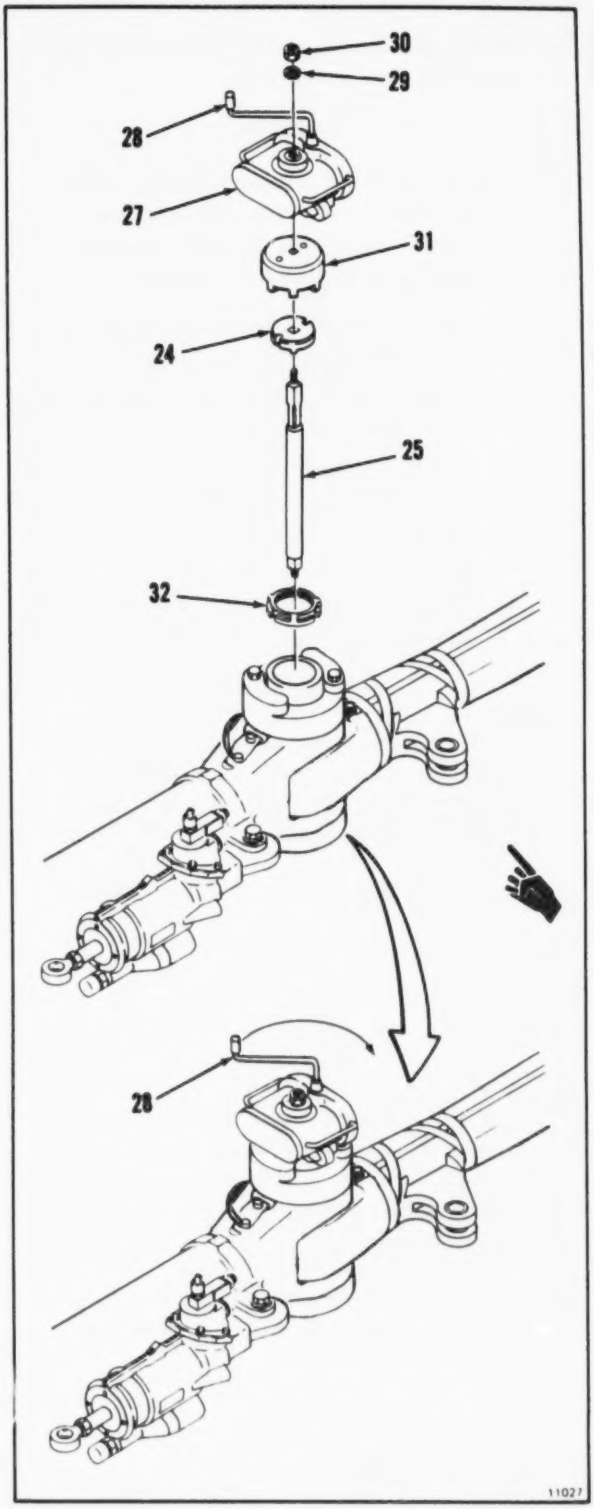
CAUTION

Do not restrain torque wrench from turning as upper pin nut is removed. Holding wrench will cause pin to turn and score pin or inner liners.

    g. Turn handle (28) clockwise to remove upper nut (32).

    h. Have helper support drive bar (25).

    i. Remove nut (30), washer (29), torque wrench (T48) (27), spanner socket (31), pilot socket (24), drive bar (25), and upper pin nut (32).



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11. **Install hydraulic vertical hinge pin puller (T79) (33)** as follows:

CAUTION

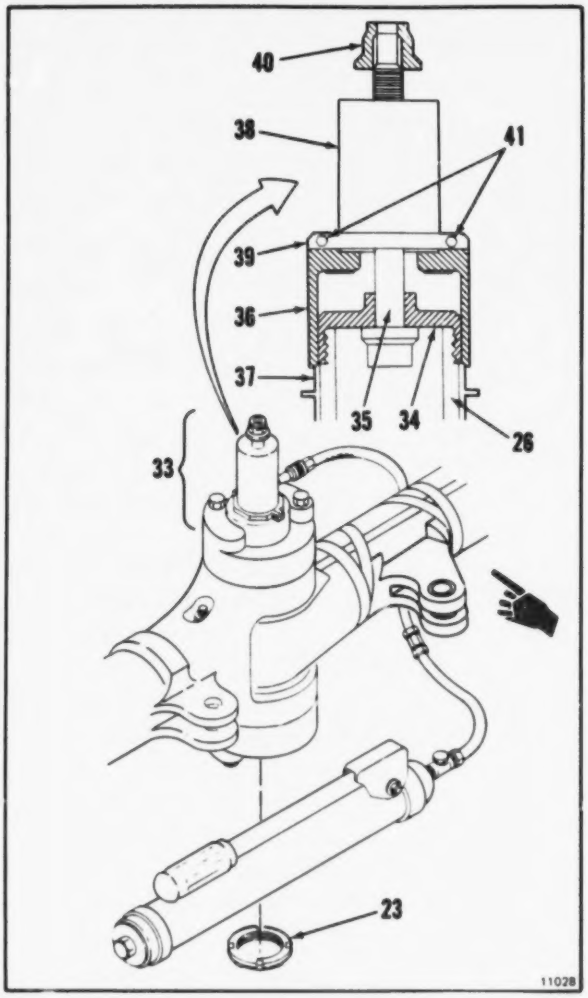
Cap must be screwed onto vertical pin completely. Incomplete thread engagement can result in damaged pin and pin puller.

   a. Screw cap (34) with bolt (35) all the way onto pin (26).
   b. Install body (36) over bolt (35) and onto inner race (37).
   c. Install hydraulic cylinder (38) over bolt (35) and into clamp (39) on body (38).
   d. Install puller nut (40) on bolt (35) finger-tight.
   e. Check that cylinder (38) is seated completely. Tighten two clamp bolts (41).

CAUTION

Do not remove pin with lower nut in place. Pressure applied to pin puller (T79) will cause damage to both inner races.

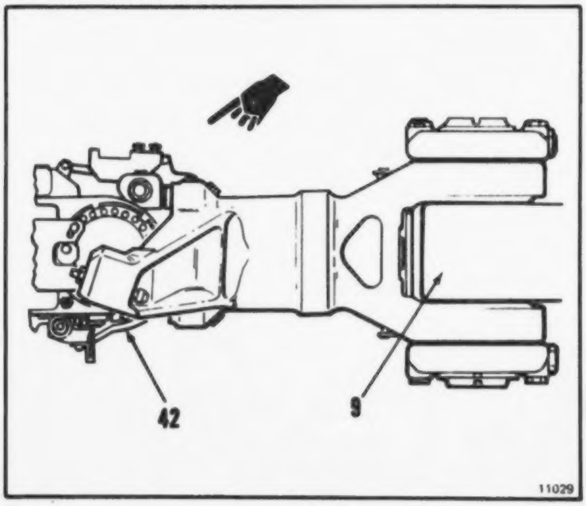
   f. Check that lower nut (23) is removed.



CAUTION

Do not remove pin without supporting blade. If blade is not supported as pin is removed, pin and blade socket can be damaged.

12. Raise blade (9) just enough to clear droop stop (42). Aft droop stop is shown here.



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WARNING

Keep personnel clear of direct line above puller nut and bolt when puller is under pressure. Personnel can be seriously injured if these parts break.

13. Operate hand pump (43) to **pull vertical pin (26) loose.**
14. **Remove hydraulic pin puller (T79) (33)** as follows:
    - a. Remove nut (40).
    - b. Loosen clamp bolts (41). Remove cylinder (38).
    - c. Remove body (36).
    - d. Remove cap (34).
15. Install rope guideline (44) at root of blade (9).
16. Hold blade (9) against pitch housing (19). Use guideline (44).

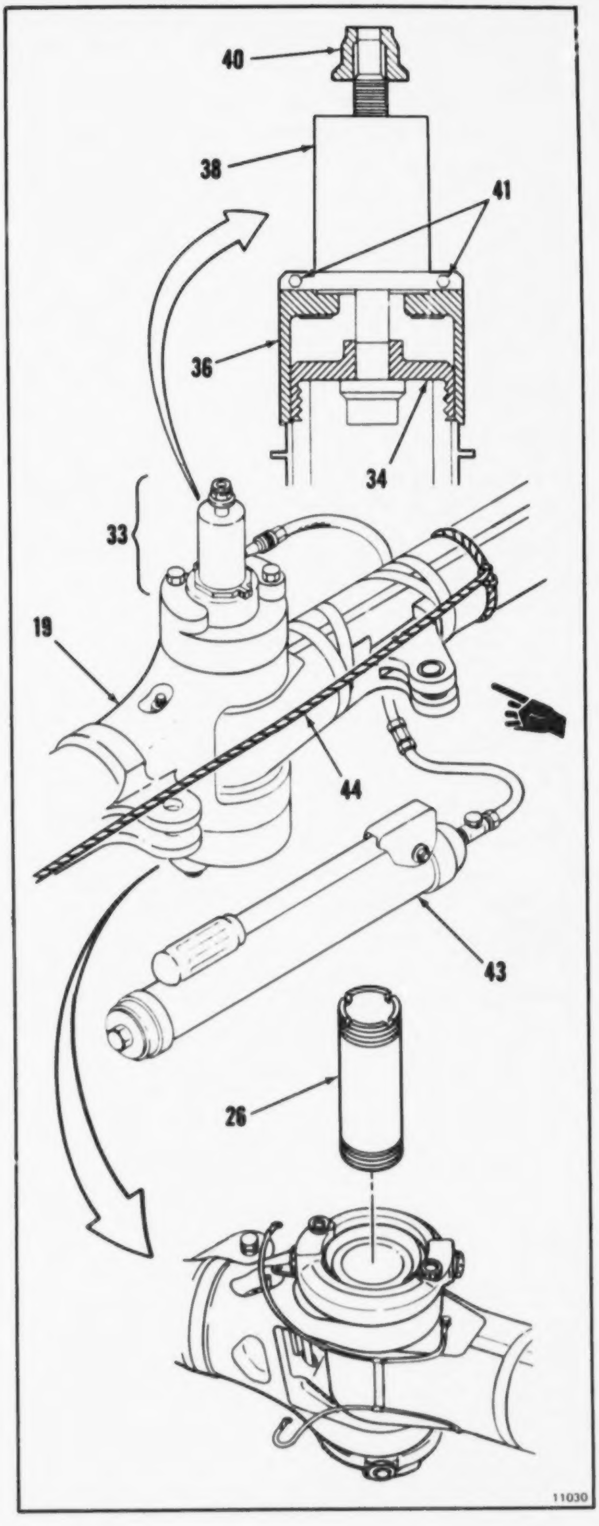
WARNING

Do not allow blade to move suddenly when pin is removed. Sudden movement can cause personal injury or equipment damage.

CAUTION

Use care in removing pin. Blade bore sleeve is easily damaged by pin or metal tools.

17. **Remove vertical hinge pin (26).**



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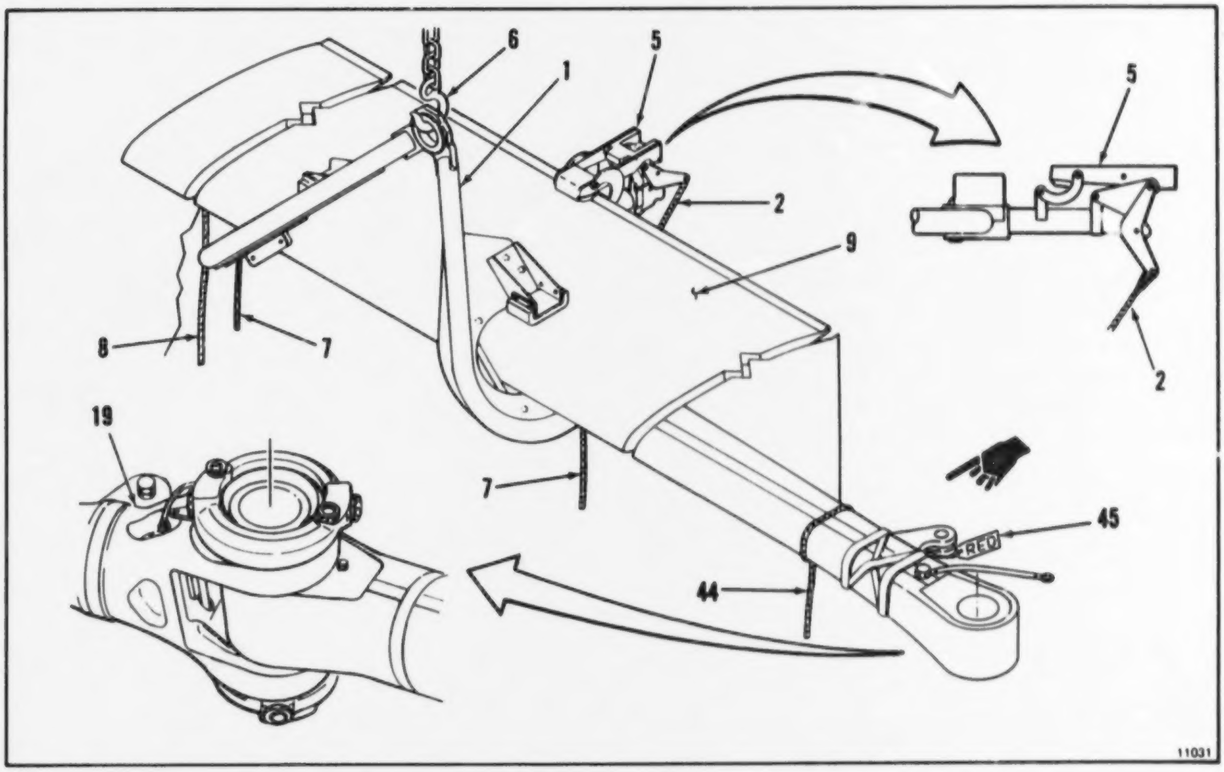
WARNING

Blade is heavy and can injure personnel if it drops. Blade must be supported by hoist and moved carefully. Do not use release rope on sling (T35) to guide blade. Clamp can be opened to release blade which can result in injury or equipment damage.

NOTE

If more than one blade is removed, tag blade with pitch housing color.

18. **Pull blade (9) clear of pitch housing (19).** Use tiedown line (8), guideline (44), and two guidelines (7) on sling (T35) (1). Use four guidelines on sling in high winds.
19. **Lower blade (9)** onto suitable supports.
20. Identify blade (9) with pitch housing color. Use paper tag (E264) (45).
21. Pull release rope (2) under blade (9) to **open clamps (5).**
22. Have helpers pull sling (T35) (1) clear of blade (9).
23. **Remove sling (T35) (1). Remove hoist (6).**



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-65 PREPARE ROTARY-WING BLADE FOR STORAGE 5-65

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Shipping Container (T86)

Materials:
Dry Cleaning Solvent (E162)
Barrier Material (E80)
Tape (E388)
Gloves (E186)

Personnel Required:
67U10 Medium Helicopter Repairer (7)
67U20 Medium Helicopter Repairer

References:
TM 55-1520-240-23P

Equipment Condition:
Off Helicopter Task

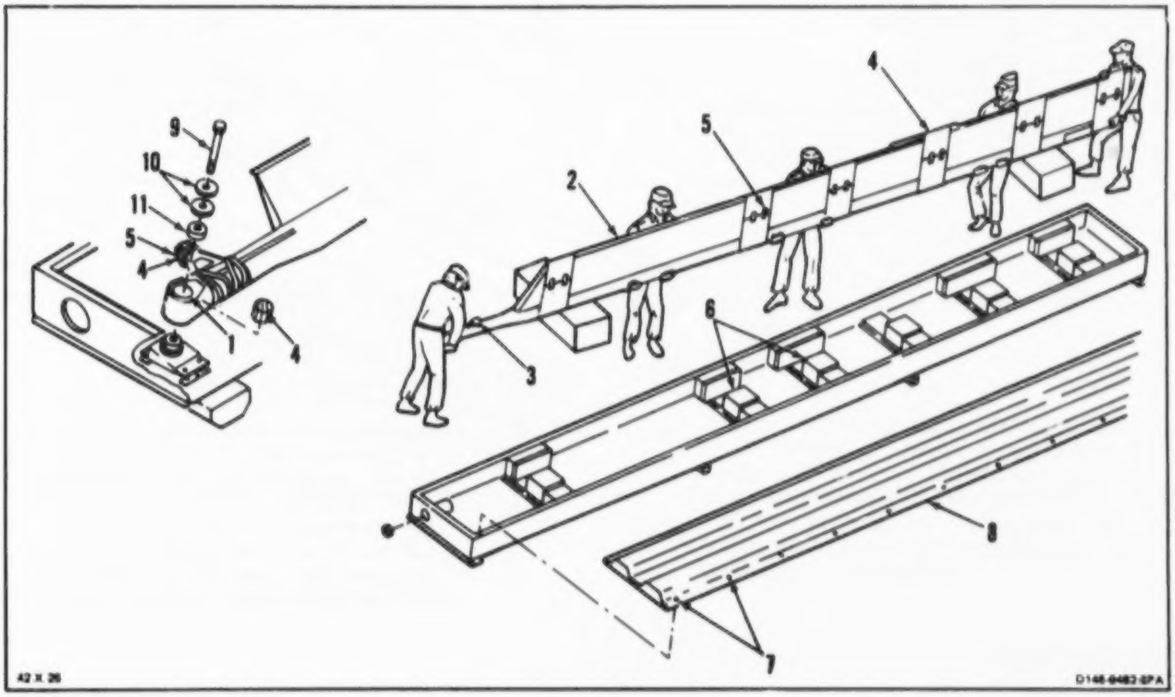
WARNING

Dry cleaning solvent (E162) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

Prior to returning any "unserviceable" fiberglass rotor blade to depot, contact local AVSCOM Logistic Assistance Representative for assistance. The blade may be a candidate for repair on site at your location.

1. Clean blade bore (1). Clean surfaces of blade (2). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
2. **Line blade bore (1) and wrap lag damper bracket (3). Use barrier material (E80) (4).** Secure barrier material. Use tape (E388) (5).



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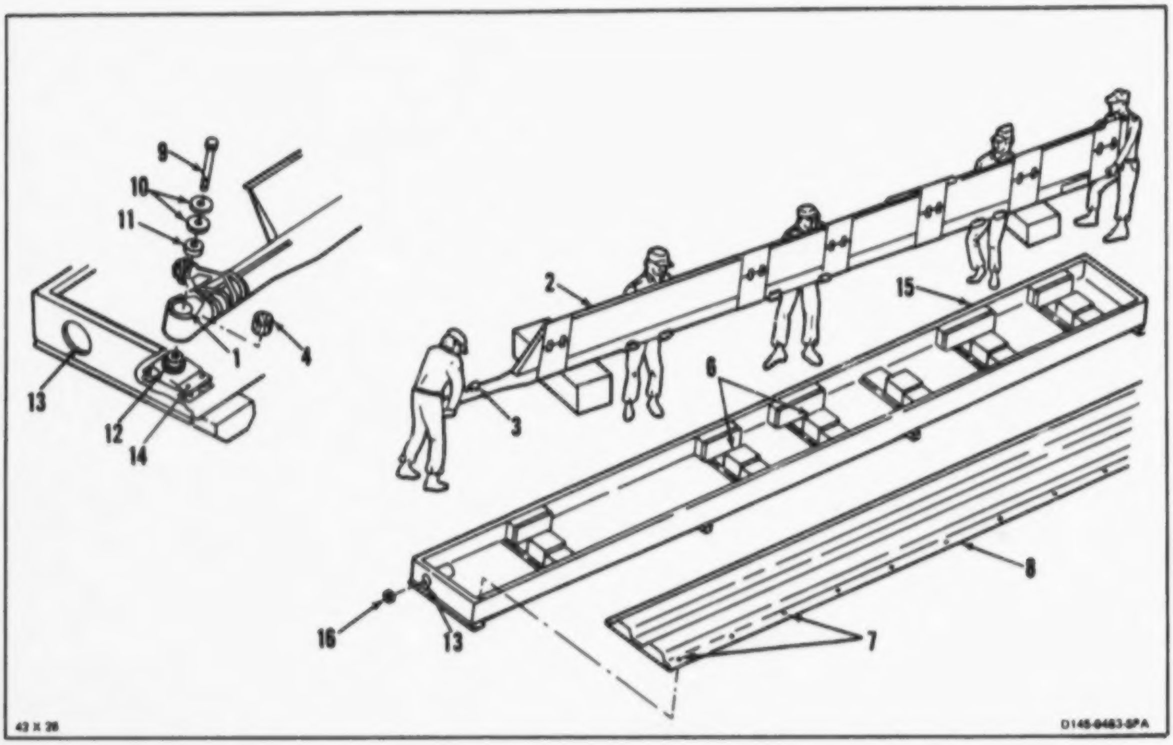
5-65 PREPARE ROTARY-WING BLADE FOR STORAGE (Continued) 5-65

3. **Wrap blade (2)** where blade will rest on six support points (6). **Use barrier material (E80) (4)** and tape (E388) (5).
4. Open 22 turnlock fasteners (7). **Remove cover (8).**
5. Remove bolt (9), washers (10), and spacer (11).
6. **Check** that **hub mount (12)** is installed leaning away from record receptacle (13) for aft blade (2). Hub mount leans toward receptacle for forward blade.
7. **If necessary,** remove four bolts (14) and **position mount (12)** in opposite direction. Install bolts.
8. Have helpers **lift blade (2) and position in shipping container (T88) (15).** Place front blade top side down.
9. **Install** spacer (11), washers (10), and **bolt (9).**
10. **Install cover (8).** Close 22 fasteners (7).
11. Remove record receptacle cap (16). **Insert records in receptacle (13).** Install cap.

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-66 REPLACE NICKEL EROSION CAP (AVIM) 5-66

INITIAL SETUP

Applicable Configurations:
All

Tools:
- Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
- Aluminum Starter Chisel
- Aluminum Final Removal Chisel
- Trip Balance, NSN 6670-00-401-7195
- Nickel Erosion Cap Replacement Fixture (T69)
- Scale
- Aluminum Scraper
- Torque Wrench, 5 to 50 Inch-Pounds
- Brush, Stiff Bristles
- Kevlar Gloves (E187)
- Heat Lamps (optional)

Materials:
- Styrofoam Blocks
- Dry Ice (E92)
- Abrasive Paper (E9)
- Gloves (E186)
- Masking Tape (E388)
- Teflon Tape (E399)
- Cloth (E120)
- Acetone (E20)
- Adhesive (E40, E41 or E43)
- Wood Spatula (E424)
- Polyethylene Cup (E157)
- Scrim Cloth (E325)
- Tape (E387)
- Teflon-Impregnated Fabric (E170)
- Rubber Sheet (E321)
- Sealant (E336)
- Primer (E291)
- Black Lacquer (E215)
- Thinner (E415)
- Metal Conditioner (E242)
- Temperature Indicating Strips (E413)

Personnel Required:
- Medium Helicopter Repairer (5)
- Aircraft Structural Repairer (2)

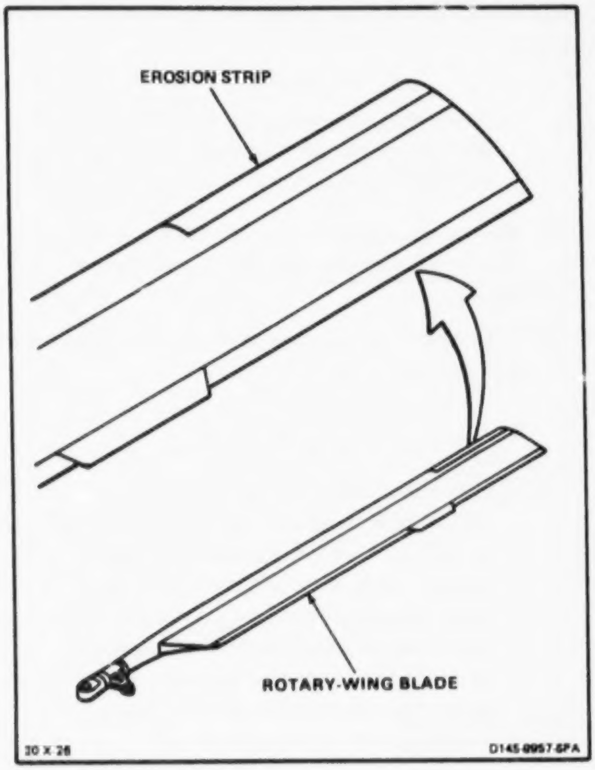
References:
Task 5-67

Equipment Condition:
Off Helicopter Task

General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



WARNING

Adhesive (E40, E41 or E43) is toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

CAUTION

Do not use cadmium plated tools or chlorinated solvents on the titanium nose cap. Contamination of titanium by these materials will result in failure. Use only the tools and materials referenced in the repair procedure.

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5-66 REPLACE NICKEL EROSION CAP (AVIM) (Continued) 5-66

NOTE

Styrofoam is preferable material for dry ice container. If styrofoam is not available, use wood.

1. **Make container (1)** with inside dimensions 55 x 9 x 5-inches. Leave top and one end open.
2. Lift corners of nickel erosion cap (2). Use aluminum starter chisel

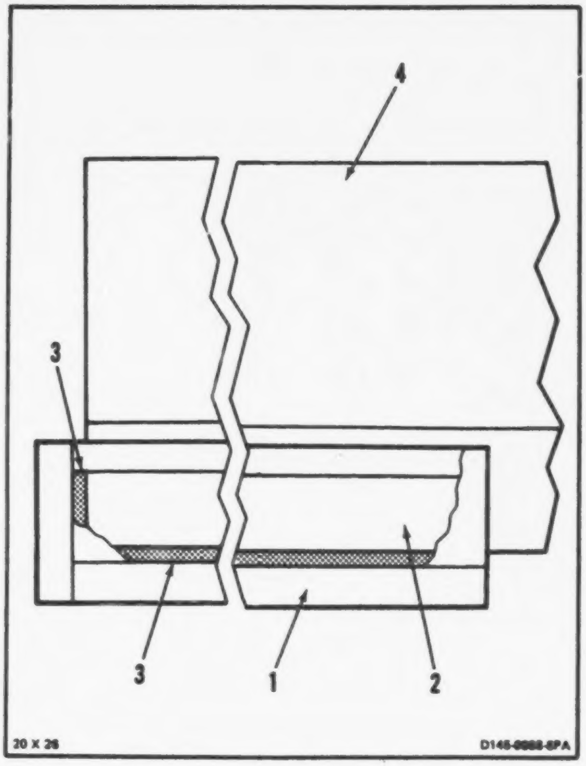
WARNING

Dry ice (E92) is toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

CAUTION

Do not allow dry ice (E92) to contact the titanium nose cap.

3. **Pack dry ice (E92) (3) 1-inch deep in bottom of container (1). Wear gloves (E187).**
4. Have helpers lift blade (4) and position **erosion cap (2) in container (1)** 1-inch from closed end.
5. **Pack dry ice (E92) (3) in end and sides of container (1).** Use only enough dry ice to cover erosion cap (2).
6. **Chill erosion cap (2)** 1 hour.
7. Have helpers **remove blade (4)** and place on supports with erosion cap (2) clear.



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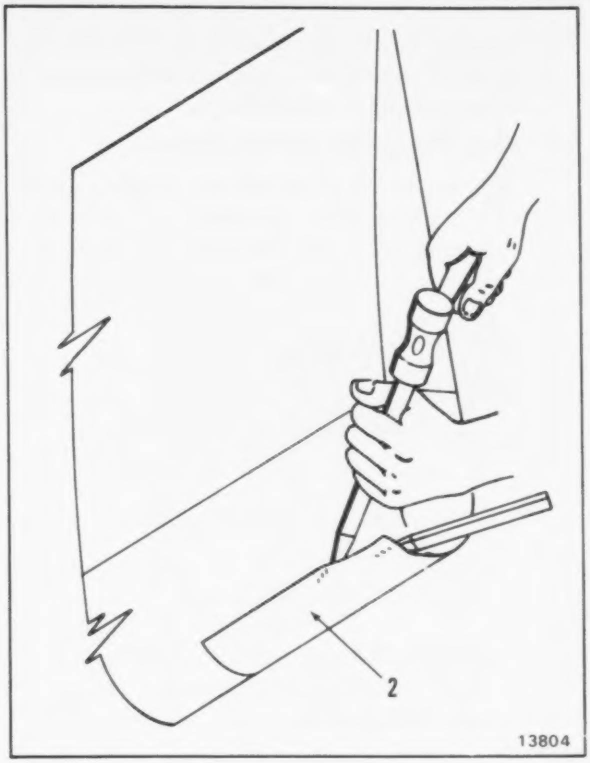
5-66 REPLACE NICKEL EROSION CAP (AVIM) (Continued) 5-66

8. **Remove erosion cap (2).** Use aluminum chisels. Begin with starter chisel at outboard trailing edge of cap. Work inboard and forward. Use final removal chisel.

8.1. **Weigh erosion cap (2).** Record weight.



9. Have helpers **position and support blade (4) with leading edge (5)** up. Do not bend trim tab (6).

CAUTION

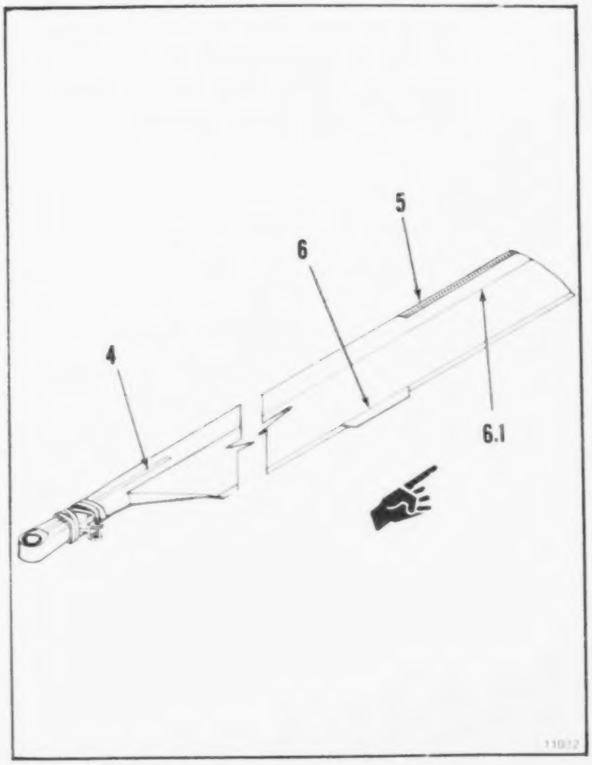
Adhesive removal is time consuming and must be done with care. Damage to the fiberglass can result in reduced fatigue strength and an altered airfoil shape.

10. **Scrape off adhesive** from leading edge (5) of blade (4). Use aluminum scraper.

11. **Allow blade (4) to warm** several hours to room temperature.

12. Sand fiberglass surface lightly to **remove adhesive.** Leave thin film of adhesive. Use care not to change airfoil shape.

12.1. Check titanium nose cap (6.1) in bond area for voids that extend to trailing edge. Repair voids (Task 5-66.1).



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5-66 REPLACE NICKEL EROSION CAP (AVIM) (Continued) 5-66

13. **Inspect for loose fibers, delaminations, and depressions.** Repair loose fibers and delaminations (Task 5-67).

14. **Repair depressions as follows:**

    a. Prepare the low area(s) by lightly sanding with abrasive paper (E9). Using a clean cloth wet with acetone, wipe the area clean of sanding particles and residue. Allow to air dry.

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41 or E43) only if prepackaged kit is not available.

    b. **Mix tube of adhesive (E40).** Follow instructions on kit.

CAUTION

Weigh and mix adhesive and resin accurately to produce acceptable bond.

    c. If adhesive (E41) is used, weigh 100 parts of resin, and 23 parts of hardener. Mix in polyethylene cup (E157) until color is uniform. Use wood spatula (E424). Wear gloves (E186).

    d. If adhesive (E43) is used, weigh 7 parts of gray hardener and 5 parts of white base. Mix in polyethylene cup (E157) until color is uniform. Use wood spatula (E424). Wear gloves (E186).

    e. Fill low area(s) with the adhesive. Blend into adjacent areas.

CAUTION

Blade temperature must not exceed 160°F (71°C). Damage to the fiberglass can occur.

NOTE

If heat is not available, a serviceable cure will be achieved at 70°F (21°C) in 36 hours.

    f. Cure the mixture at 110°F to 130°F (43°C to 54°C) for 16 hours. Monitor with temperature indicating strips (E413).

    g. After cure is complete, lightly sand the repair to match the adjacent areas.

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5-66 REPLACE NICKEL EROSION CAP (AVIM) (Continued) 5-66

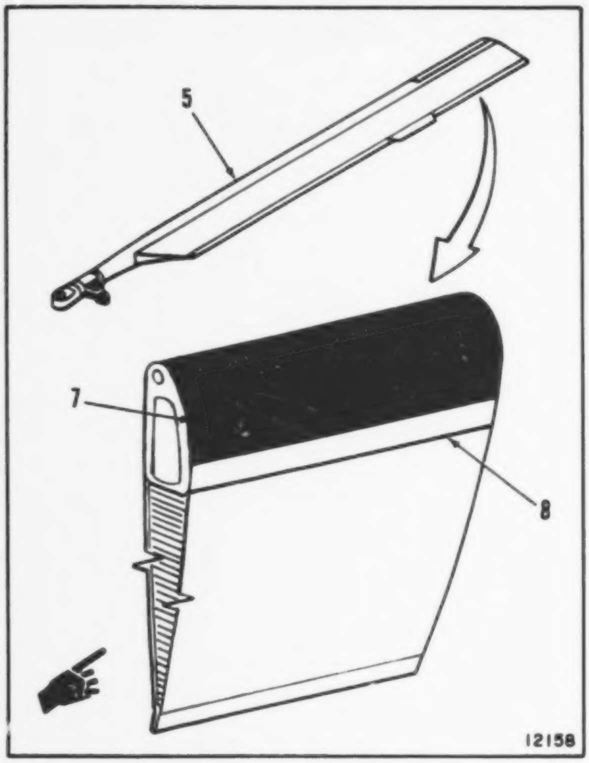
15. **Prepare bonding surface (7)** as follows:

    a. Sand bonding surface (7) lightly to remove glaze. Use abrasive paper (E9).

    b. Mask area around bonding surface (7). Use masking tape (E388) (8).

    c. Clean bonding surface (7) and replacement cap. Use cloth (E120) damp with acetone (E20). Wear gloves (E186). Wipe dry with a clean cloth. Do not allow solvent to evaporate.

    d. Remove masking tape (E388) (8).



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5-66 REPLACE NICKEL EROSION CAP (AVIM) (Continued) 5-66

e. Weigh replacement erosion cap (3). Record weight.

f. Mask titanium nose cap (9) around bond surface (7), and replacement erosion cap (3). Use teflon tape (E399) 2-inches wide.

16. Cut piece of scrim cloth (E325) (10) to fit bonding surface (7).

NOTE

- Prepackaged adhesive (E40) is preferred. Use adhesive (E41) or (E43) only if prepackaged kit is not available.
- Working life of all adhesives is about 30 minutes at 70°F to 80°F (21°C to 27°C. Working life decreases as temperature goes up.

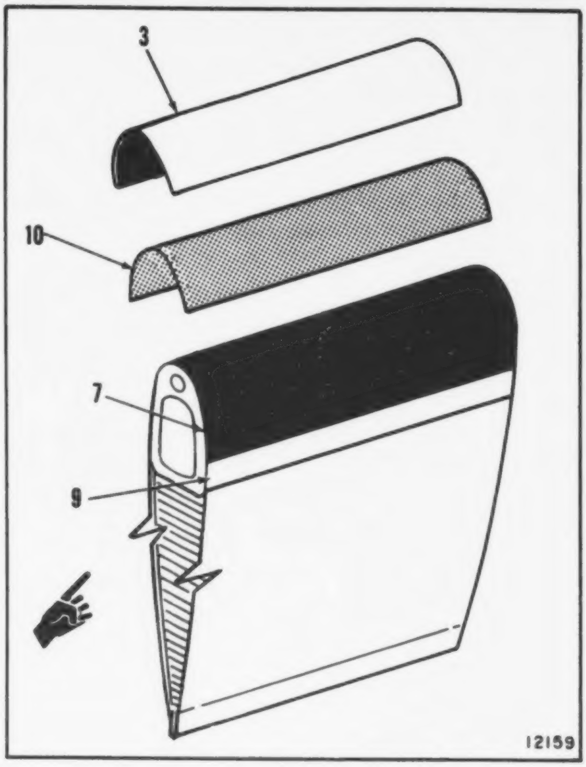
17. **Mix adhesive (E40).** Follow instructions on kit.

CAUTION

Weigh and mix adhesive and resin accurately to produce acceptable bond.

a. If adhesive (E41) is used, weigh 300 grams of resin, and 69 grams of hardener. Mix in polyethylene cup (E157) until color is uniform. Use wood spatula (E424). Wear gloves (E186).

b. If adhesive (E43) is used, weigh 198 grams of gray hardener and 142 grams of white base. Mix hardener and base in polyethylene cup (E157). Use wood spatula (E434). Wear gloves (E186).



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5-66 REPLACE NICKEL EROSION CAP (AVIM) (Continued) 5-66

NOTE

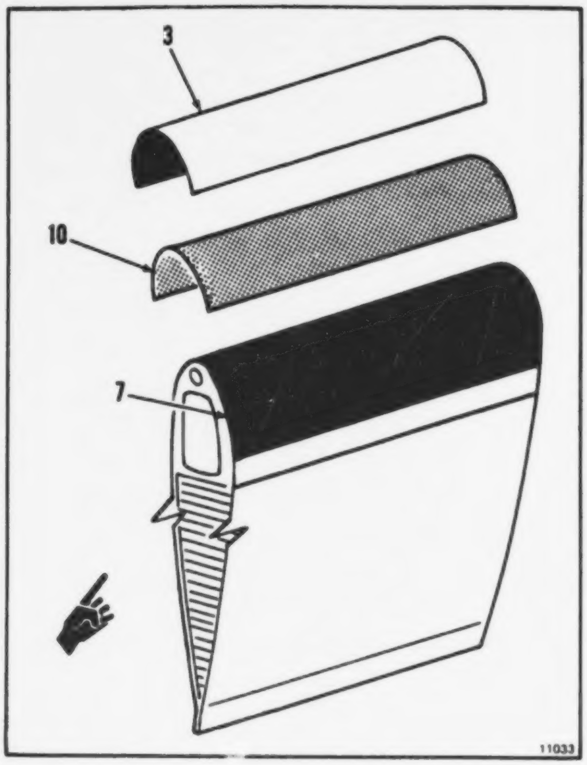
Working life of adhesive (E40, E41 or E43) is about 30 minutes.

18. **Apply adhesive (E43)** as follows:
    a. Coat bonding surface (7) with adhesive. Use stiff-bristle brush. Wear gloves (E186).
    b. Position scrim cloth (E325) (10) on bonding surface (7). Work scrim cloth into adhesive (E43) until completely coated.
    c. Apply heavy coat of adhesive (E43) to inside of erosion cap (3). Be sure inside leading edge is well covered.

19. **Position erosion cap (3)** on bonding surface (7). Seat cap firmly. **Apply tape (E387)** 2-inches wide across cap to hold cap on blade. Start at tip end. Position tape strips about 6-inches apart.

NOTE

Place tape so that some strips fall about halfway between clamps when fixture (T69) is installed.



5-66 REPLACE NICKEL EROSION CAP (AVIM) (Continued) 5-66

20. Cut sheet of teflon-impregnated fabric (E170) (11) and sheet of rubber (E321) (12). **Position teflon-impregnated fabric** over repair. **Position rubber over teflon-impregnated fabric.**

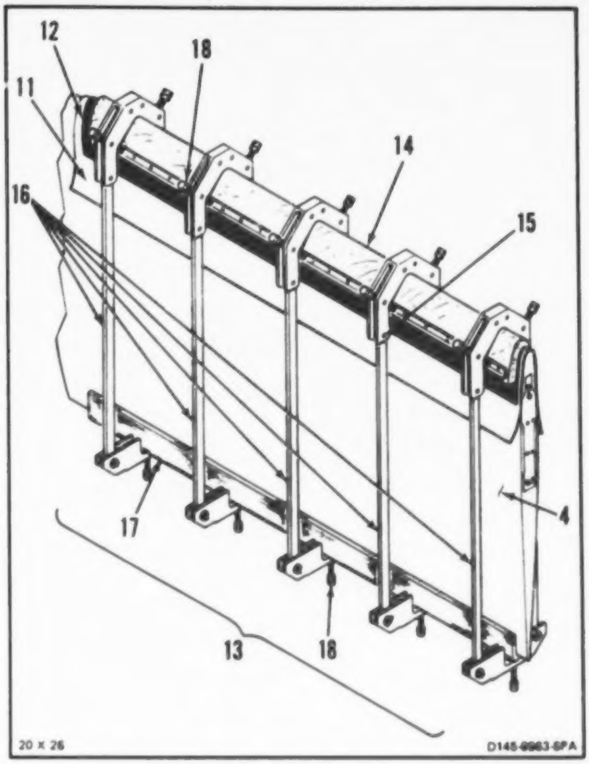
21. **Install erosion cap replacement fixture (T69) (13)** as follows:

    a. Position tool collar (14) over rubber sheet (E321) (12).

    b. Remove retaining pin (15) from each of five clamping tools (16).

    c. Position trailing edge bar (17) over trailing edge of blade (4). Hold in place.

    d. Position clamping tool (16) over tool collar (14) and trailing edge bar (17), 3-inches from inboard end of bar. Position remaining four clamping tools 16-inches apart. Install retaining pins (15).



CAUTION

Overtightening leading and trailing edge jackscrews can damage blade.

22. **Tighten clamping tool jackscrews (18)** as follows:

    a. Tighten trailing edge jackscrews (18) on end clamps (16). Tighten leading edge jackscrews on end clamps.

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5-66 REPLACE NICKEL EROSION CAP (AVIM) (Continued) 5-66

b. Tighten trailing edge jackscrew (18), then leading edge jackscrews on center clamp (16).

c. Tighten trailing edge jackscrews (18), then leading edge jackscrews on clamps (16) between center and end clamps.

d. **Torque all trailing edge jackscrews to 40 inch-pounds.**

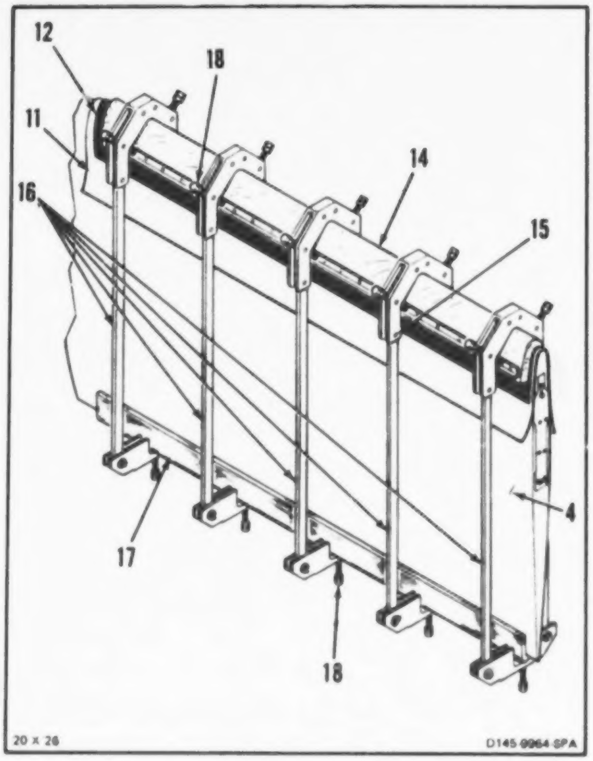
e. **Torque all leading edge jackscrews (18) to 20 inch-pounds.**

WARNING

Adhesive will not cure at temperatures less than 60°F (16°C). Faulty curing can result in bond failure causing injury to personnel and damage to equipment. Do not count curing time periods at temperatures less than 70°F (21°C) into curing time total.

23. **Cure adhesive (E43) 24 hours.**

24. Loosen 15 jackscrews (18). **Remove** five retaining pins (15) and **clamping tools (16).** Remove trailing edge bar (17), leading edge collar (14), rubber sheet (E321) (12) and teflon-impregnated fabric (E168) (11).



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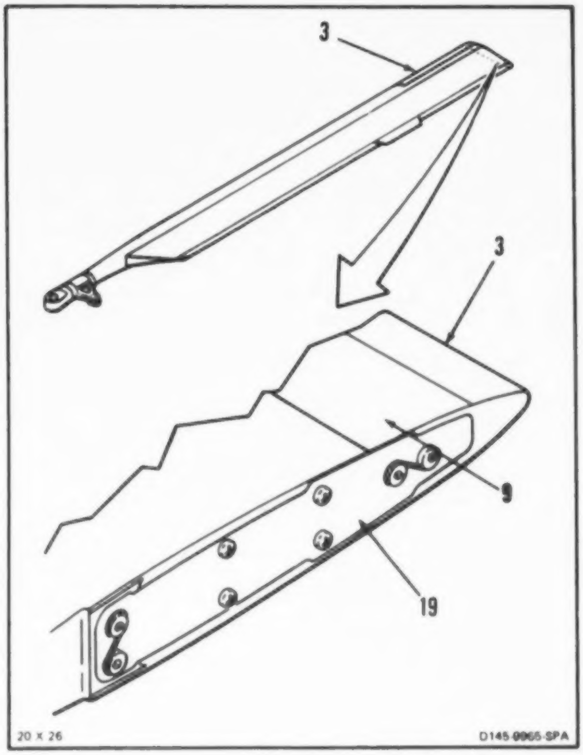
5-66 REPLACE NICKEL EROSION CAP (AVIM) (Continued) 5-66

25. Check that erosion cap (3) is flush with titanium cap. Check that cap (3) is flush with tip cover (19). Blend if necessary. Use file.

WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

26. **Fair adhesive squeezeout.** Use abrasive paper (E9). If necessary, fair with sealant (E336). Wear gloves (E186).



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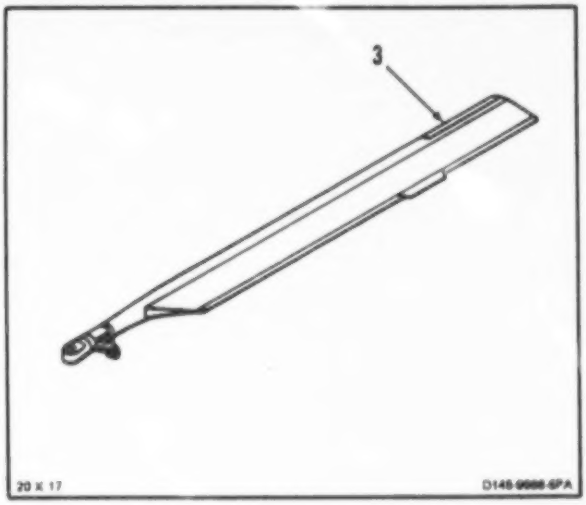
5-66 REPLACE NICKEL EROSION CAP (AVIM) (Continued) 5-66



27. **Clean erosion cap (3)** as follows:
    - a. Clean erosion cap (3). Use metal conditioner (E242) mixed with three parts of water. Wipe mixture on cap. Use cloth (E120).
    - b. Wipe mixture with cloth (E120) damp with water.
    - c. Dry cap (3). Use cloth (E120).
28. **Apply** thin mist coat of **primer (E293)** to cap (3). Wear gloves (E186). Air dry 1 hour.

WARNING

Lacquer (E215) is extremely flammable. It can be toxic. Keep away from heat, sparks, or open flames. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Thinner (E415) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

29. **Thin flat black lacquer (E215).** Use thinner (E415). Follow manufacturers instructions. Wear gloves (E186). **Apply two coats.** Allow to dry 45 minutes between coats.

NOTE

Apply lacquer (E215) within 2 hours after primer (E293) is applied.

INSPECT

FOLLOW-ON MAINTENANCE:

Track and balance blades (Task 5-139, 5-140, 5-141, and 5-142).

END OF TASK

5-66.1 REPAIR OF NOSE CAP OR EROSION CAP UNBONDING 5-66.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit,
NSN 5180-00-323-4876
Shim, 0.005-Inch Thick
Aluminum Scraper (Appx E-29)
Shot Bags
Heat Lamps (Optional)
Trip Balance NSN 6670-00-401-7195

Materials:

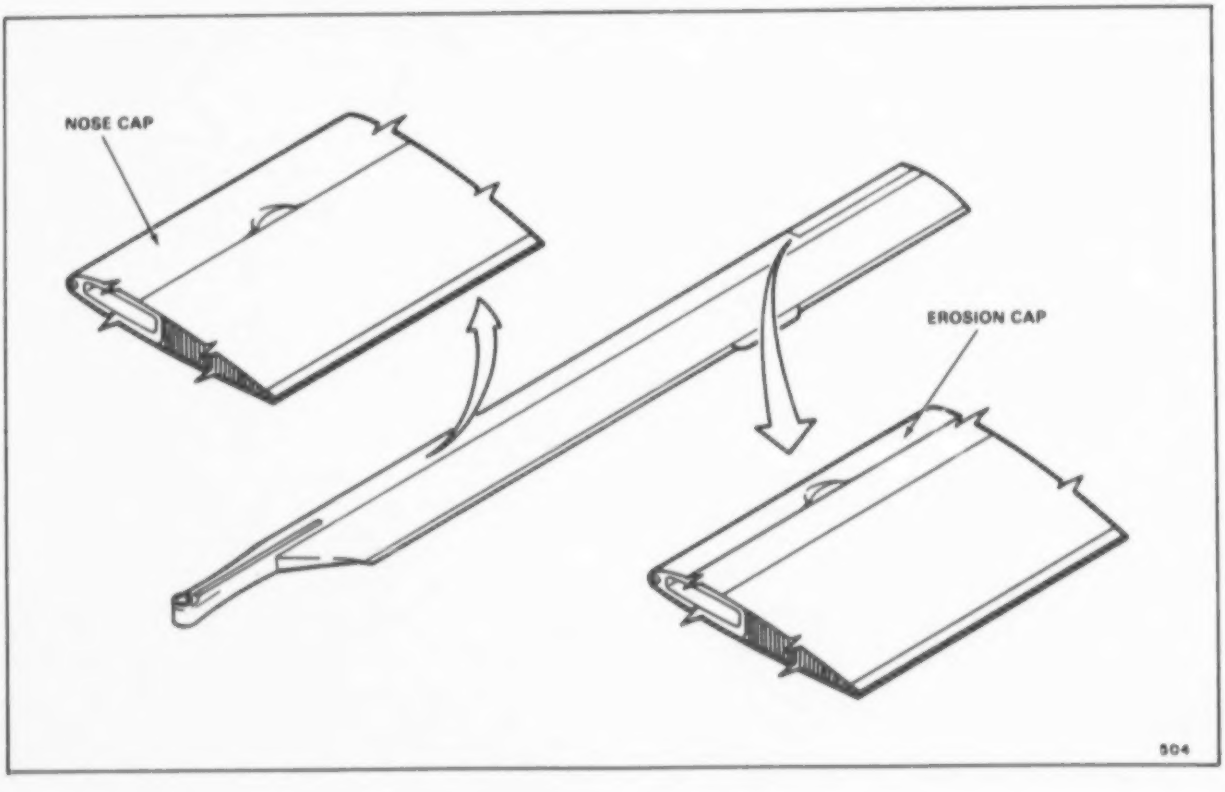
Teflon Tape (E399)
Aluminum Foil (E66)
Gloves (E186)
Squeeze Bottle (E366)
Acetone (E20)
Adhesive (E43)
Polyethylene Cup (E157)
Tongue Depressor (E424)
Cloth (E120)
Peel Ply (E270)
Rubber Sheet (E321)
Abrasive Paper (E9)
Aliphatic Naphtha (E245)
Temperature Indicating Strips (E413)

Personnel Required:

Aircraft Structural Repairer
Inspector

Equipment Condition:

Off Helicopter Task



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5-66.1 REPAIR OF NOSE CAP OR EROSION CAP UNBONDING (Continued) 5-66.1

NOTE

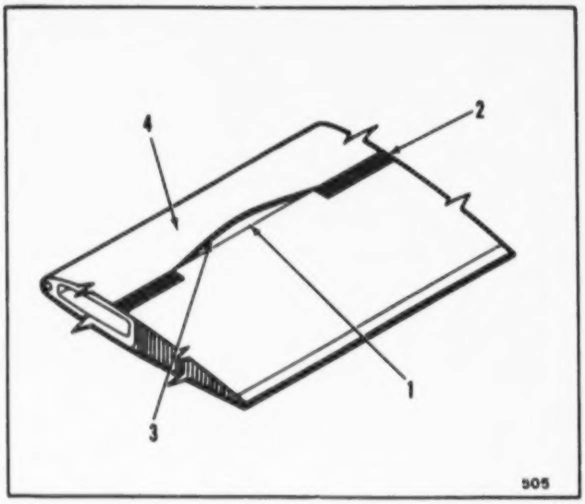
Procedure for repair of titanium nose cap and nickel erosion cap are similar. Differences are noted in text. Repair bond voids only if they reach to edge of cap.

1. **Find size of void (1).** Use 0.005-inch thick shim as a probe. Mark outline of void with pencil or chalk.

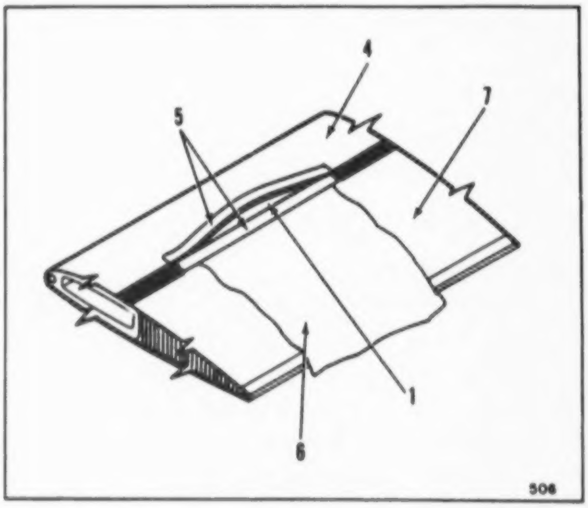
CAUTION

Do not damage fiberglass when removing adhesive aft of nose cap.

2. **Remove adhesive squeezeout (2)** at trailing edge (3) of cap (4). Remove adhesive along full width of void. Use aluminum scraper (Appx E-29).



3. **Mask area around void (1).** Use teflon tape (E399) (5) forward of cap trailing edge (3). Use aluminum foil (E66) (6) and teflon tape (5) aft of cap trailing edge.
4. **Open void (1)** at edge of cap (4). Use clean 0.005-inch thick shim stock.
5. **Position blade (7)** so leading edge is higher than trailing edge.



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5-66.1 REPAIR OF NOSE CAP OR EROSION CAP UNBONDING (Continued) 5-66.1

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. in case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

6. **Clean void (1).** Fill plastic squeeze bottle (E366) with acetone (E20). Flush void with acetone until acetone runs clear. Allow to dry for 15 minutes .

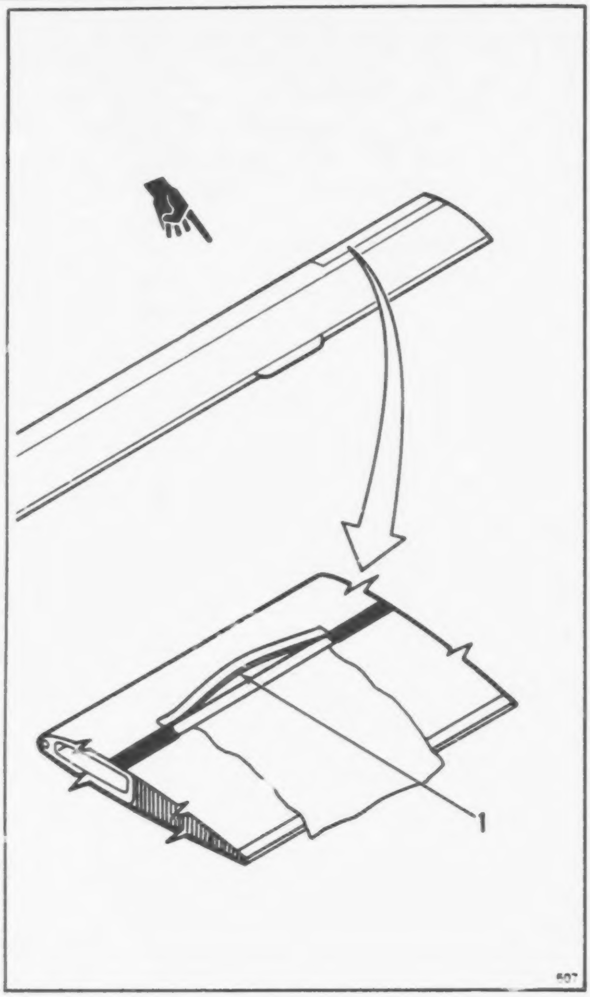
WARNING

Adhesive (E43) is toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

7. **Mix adhesive (E43)** as follows:
   a. Mix 5 parts by weight of white base with 7 parts by weight of grey hardener. Use clean polyethylene cup (E157) and trip balance.
   b. Stir mixture until color is uniform. Use wooden spatula (E424).

NOTE

Adhesive has working life of about 30 minutes.



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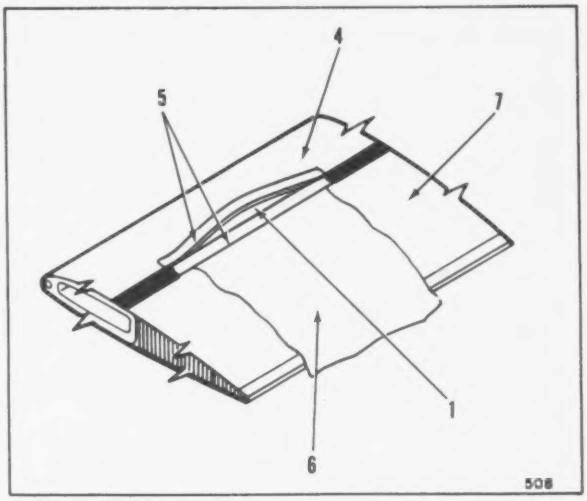
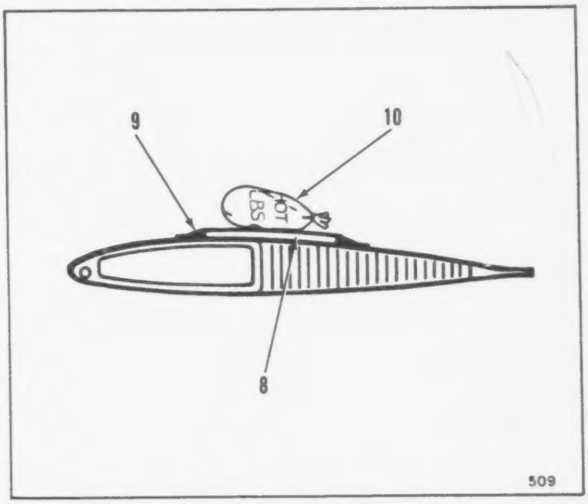
5-66.1 REPAIR OF NOSE CAP OR EROSION CAP UNBONDING (Continued) 5-66.1



8. **Position blade (7)** so void (1) is level.
9. **Fill void (1) with adhesive (E43).** Use clean 0.005-inch shim stock to work adhesive into void. Fill deepest part of void first to prevent trapping of air.
10. **Close void (1).** Press cap (4) against blade by hand. Remove excess adhesive. Use cloth (E120).
11. **Remove tape (5) and aluminum foil (6).**



12. **Cure repair** as follows:
    a. Cover the repair with peel ply (E270) (8).
    b. Cut piece of 1/4-inch thick rubber sheet (E321) to cover repair. Position rubber sheet (9) over peel ply (8).
    c. Apply pressure of 2 to 3 pounds for each square inch of repair. Apply pressure evenly over repair. Use shot bags (10).

CAUTION

Blade temperature must not exceed 160°F (71°C). Overheating will damage fiberglass.

    d. Cure repair at 140°F (60°C) to 160°F (71°C) for 2 hours . Use heat lamps. Monitor blade temperature. Use temperature indicating strips (E413).

NOTE

If heat lamps are not available, cure at 70°F (21°C) for 24 hours . Shot bags can be removed after 12 hours .

13. **Remove shot bags (10), rubber sheet (9), and peel ply (8).**

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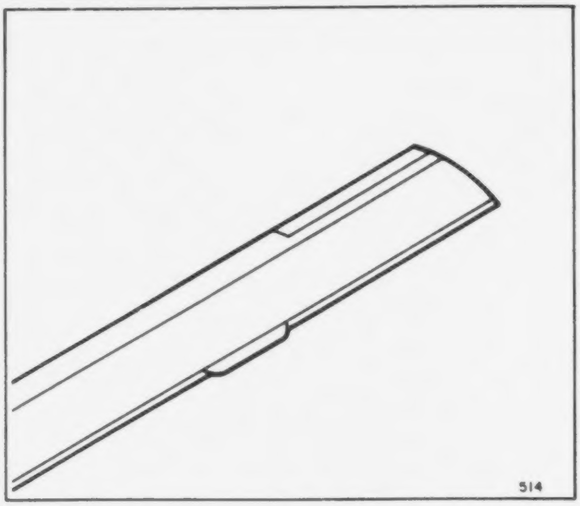
5-66.1 REPAIR OF NOSE CAP OR EROSION CAP UNBONDING (Continued) 5-66.1

14. **Remove excess adhesive.** Use abrasive paper (E9).

WARNING

Naphtha (E245) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

15. **Clean repair area.** Use cloth (E120) damp with naphtha (E245). Wipe dry with clean cloth before naphtha dries.



INSPECT

FOLLOW-ON MAINTENANCE:

Refinish repaired area as required (Task 5-82).

END OF TASK

5-66.2 REPAIR TITANIUM NOSE CAP CRACKS (AVIM) 5-66.2

INITIAL SETUP

Applicable Configurations:

All

Tools:

- Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
- Rotor Blade Adapter (T164)
- Trip Balance NSN 6670-00-401-7195
- Vacuum Source
- Aluminum Tube, 8 Inches Long, Diameter to Fit Vacuum Hose
- Wooden Blocks
- Cargo Strap, 72 Inches Long
- Heat Lamps

Materials:

- Polyvinyl Sheet (E284)
- Masking Tape (E388)
- Abrasive Paper (E9)
- Teflon Tape (E399)
- Repair Doubler (E160.1)
- Gloves (E186)
- Cloth (E120)
- Acetone (E20)
- DeSoto Primer (E291.1)
- Cheesecloth (E112)
- Scrim Cloth (E325)
- Adhesive (E43)
- Polyethylene Cup (E157)
- Tongue Depressor (E424)
- Sealant (E336)
- Teflon Impregnated Fabric (E170)
- Fiberglass Cloth (E132)
- Sealing Tape (E396)
- Rubber Sheet (E319)
- Temperature Indicating Strips (E413)
- Epoxy Primer (E292)
- Aliphatic Naphtha (E245)
- Lusterless Black Lacquer (E215)
- Thinner (E415)

Personnel Required:

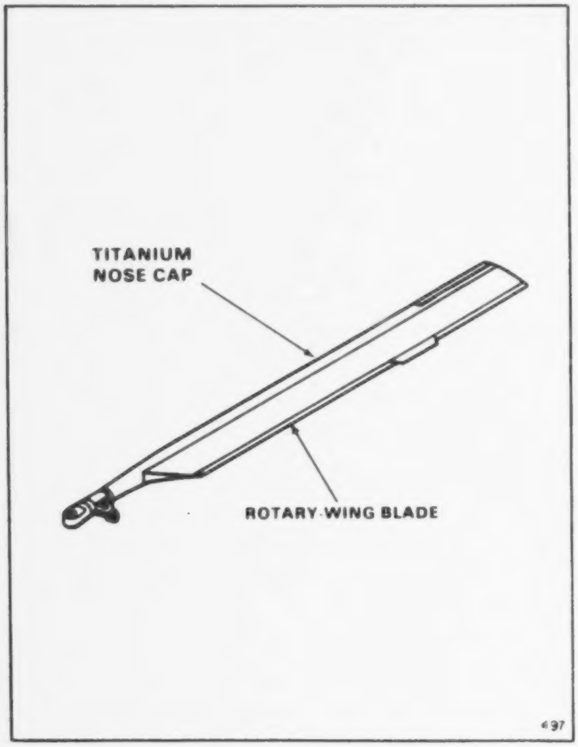
- Aircraft Structural Repairer
- Inspector

References:

Task 5-66.1

Equipment Condition:

Off Helicopter Task



General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

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5-66.2 REPAIR TITANIUM NOSE CAP CRACKS (AVIM) (Continued) 5-66.2

WARNING

The preparation and bonding of the titanium nose cap doubler is a critical repair. It must be performed exactly as described. If possible, surface preparation and bonding shall be done in a controlled environment to avoid contamination and to obtain proper adhesive cure. Failure to follow these instructions can result in unbonding of the doubler and subsequent injury to personnel.

CAUTION

Do not repair titanium nose cap cracks outboard of sta 303.

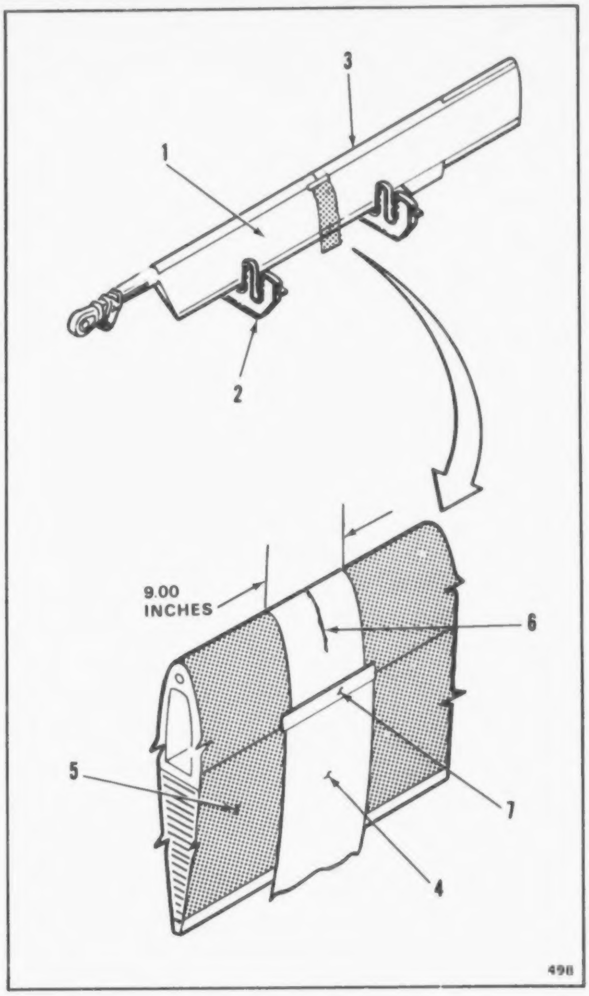
NOTE

There is no limit to the number of repairs that can be done on a nose cap. The minimum distance between repairs, measured between centerlines, shall be 12 inches. If cracks occur closer than 12 inches, blade is not reparable at this level.

1. **Position blade (1) in adapter (T164) (2)** with nose cap (3) up.
2. **Tape polyvinyl sheets (E284) (4) over top and bottom of blade (5)** aft of crack (6). Use masking tape (E388) (7).

WARNING

Remove only black lacquer finish. Green primer must remain to provide satisfactory bond. If bare titanium is exposed, DeSoto primer (E291.1) must be applied.



CAUTION

Do not use chlorinated solvents on titanium nose cap or doubler. These solvents cause material failure.

3. **Remove black lacquer from strip 4-1/2 inches wide** on each side of crack (6) on both sides of cap (3). Use abrasive paper (E9). Use very light pressure. Sand only as required to remove lacquer.

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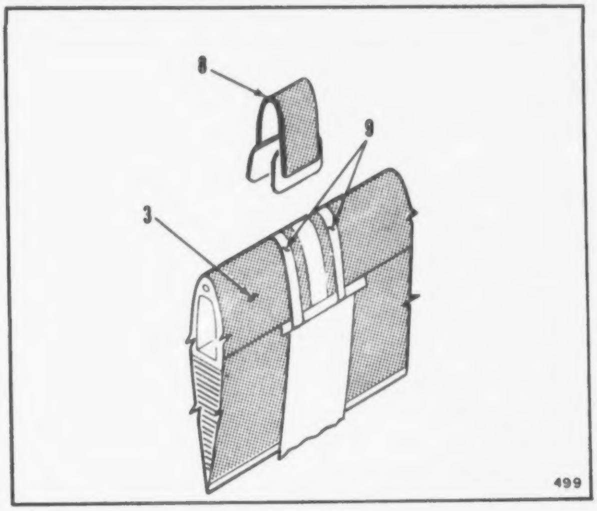
5-66.2 REPAIR TITANIUM NOSE CAP CRACKS (AVIM) (Continued) 5-66.2

4. **Position repair doubler (E160.1) (8)** centered over crack. **Mask cap (3) 1/4-inch outside doubler.** Use teflon tape (E399) (9). Remove doubler.

CAUTION

Do not apply acetone to teflon tape. Acetone will dissolve tape adhesive and contaminate repair area.

5. **Clean repair area.** Use cloth (E120) damp with acetone (E20). Wipe immediately with clean dry cloth. Clean as required to remove black lacquer. Excess acetone will remove primer.



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5-66.2 REPAIR TITANIUM NOSE CAP CRACKS (AVIM) (Continued) 5-66.2

6. **Inspect cap (3) for unbonding** along edge of crack. If bond void is found, flush with acetone and rebond (Task 5-66.1).
7. **Inspect repair area (10).** If more than 5 percent of titanium is bare, prime area as follows:

WARNING

Primer (E291.1) is toxic. Avoid inhaling. Use only with adequate ventilation. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

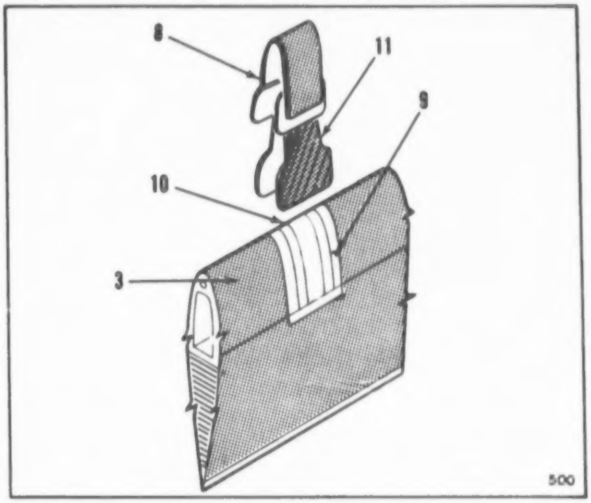
   a. Mix primer (E291.1). Mix 4 parts by volume of primer base with 1 part by volume of curing solution.
   b. Apply a thin film of primer (E291.1) to the repair area. Use cheesecloth (E112).

CAUTION

Do not exceed 160°F (71°C). Higher temperature can damage fiberglass.

   c. **Cure repair at 140°F to 160°F (60°C to 71°C) for 2 hours. Use heat lamps. Monitor temperature. Use temperature indicating stripes (E413). If heat lamps are not available, cure for 12 hours at 70°F (21°C) .**

8. **Cut piece of scrim cloth (E325) (11)** 1/8 inch larger than doubler (8) on each edge.



WARNING

Adhesive (E43) is toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

9. **Mix 3 ounces of prepackaged adhesive (E43).** Follow manufacturer's instructions. Mix until color is uniform light grey. Go to step 11.
10. **If prepackaged adhesive is not available, mix adhesive (E43) as follows:**
    a. Mix 5 parts by weight of base (white) with 7 parts by weight of hardener (gray).

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5-66.2 REPAIR TITANIUM NOSE CAP CRACKS (AVIM) (Continued) 5-66.2

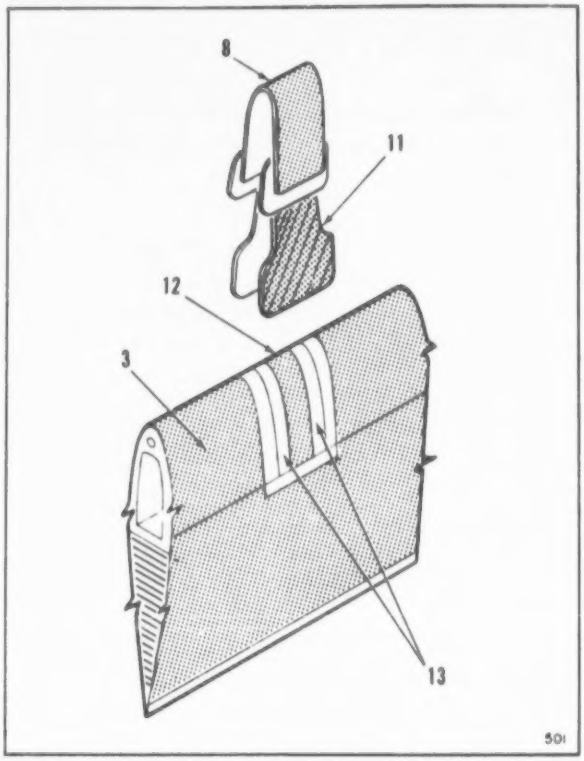
b. Mix adhesive in polyethylene cup (E157) until color is uniform. Use tongue depressor (E424).

11. **Apply adhesive (E43) to a 1 1/2-inch wide strip (12)** on both sides of crack. Adhesive should extend to full chordwise depth of nose cap (3).

WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

12. **Apply sealant (E336) to a 1-inch wide strip (13) on either side of adhesive (E43) (12).** Total width of adhesive and sealant should be 5 inches.
13. Position scrim cloth (E325) (11) centered over crack. **Tamp scrim cloth into adhesive** and sealant until cloth is completely saturated. More adhesive can be added to obtain heavy coat.
14. **Remove peel ply from repair doubler (8).**
15. Spread ends of repair doubler (8) slightly and position over repair area. **Press doubler (8) firmly against leading edge of cap (3).**



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5-66.2 REPAIR TITANIUM NOSE CAP CRACKS (AVIM) (Continued) 5-66.2

16. **Prepare area for bonding** as follows:

    a. Cover repair with teflon impregnated fabric (E170) (14). Fabric should overlap repair 3 inches on each edge.

    b. Cover teflon impregnated fabric (14) with fiberglass cloth (E132) (15). Secure fiberglass cloth with masking tape (E388) (16).

    c. Apply sealing tape (E396) (17) around repair area.

    d. Wrap two layers of fiberglass cloth (E132) (18) around end of aluminum tube (19). Secure cloth to tube with masking tape (E388) (20).

    e. Connect tube (19) to vacuum source.

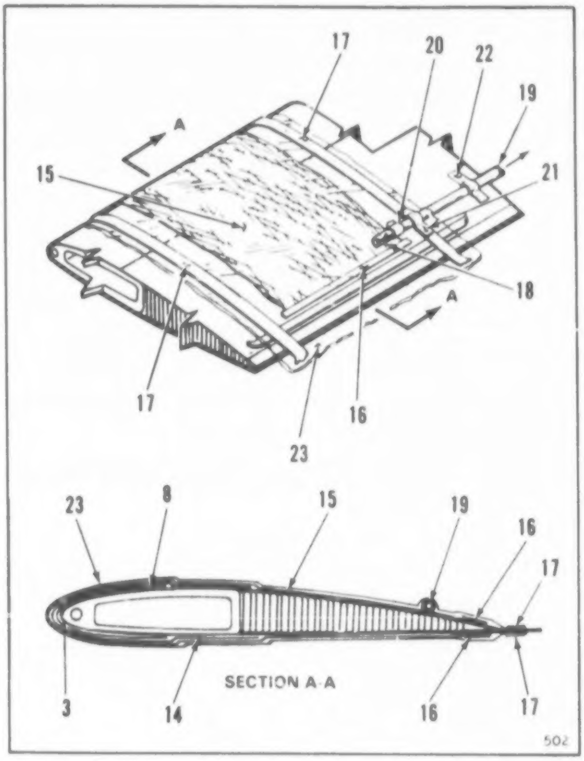
    f. Position tube (19) on fiberglass cloth (15) near the blade trailing edge. Wrap two layers of sealing tape (E396) (21) around tube (19) where it crosses sealing tape (17).

    g. Press tube (19) into surrounding sealing tape (17) to form air tight seal. Secure tube to blade. Use masking tape (E388) (22).

    h. Cover repair area with polyvinyl sheet (E284) (23). Press sheeting onto sealing tape (17) to form air tight seal.

NOTE

Spread polyvinyl sheeting smoothly. Keep wrinkles at a minimum to avoid air leaks.



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5-66.2 REPAIR TITANIUM NOSE CAP CRACKS (AVIM) (Continued) 5-66.2

i. Operate vacuum pump. Smooth wrinkles in polyvinyl sheet (23).

j. Check for air leaks. Adjust sheeting (23) or add sealing tape (E396) if needed.

k. Clamp wooden blocks (24) on both sides of blade trailing edge.

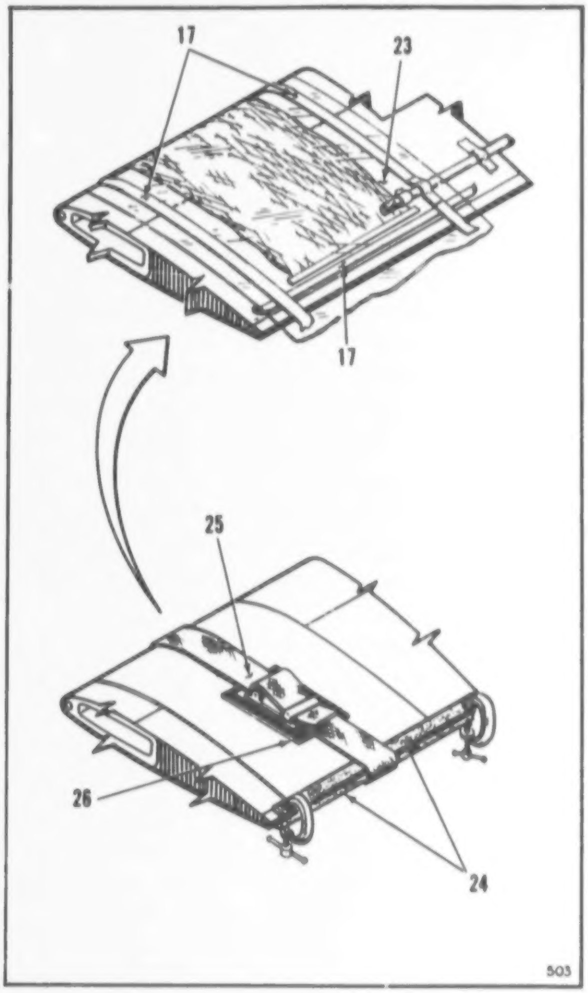
l. Place cargo strap (25) around blade to secure nose cap doubler. Position rubber pads (26) to protect polyvinyl sheet (23) from cargo strap buckle. Make pads (26) from rubber sheet (E319).

m. Tighten cargo strap (25) to fully seat repair doubler on nose cap.

n. Maintain 20 inches Hg minimum vacuum during cure.

CAUTION

Do not exceed 160°F (71°C) . Higher temperature can damage fiberglass.



5-66.2 REPAIR TITANIUM NOSE CAP CRACKS (AVIM) (Continued) 5-66.2

17. **Cure repair** at 140°F to 160°F (60°C to 71°C) for 2 hours . Use heat lamps. Monitor temperature. Use temperature indicating strips (E413). If heat lamps are not available, go to step 18.

WARNING

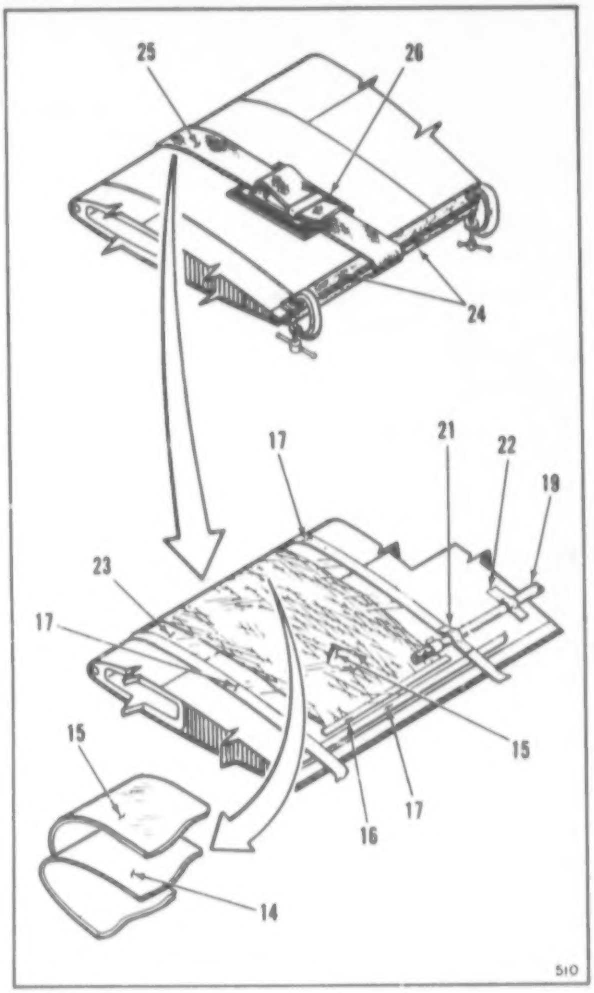
Adhesive will not cure at temperature below 60°F (15°C) . Improper cure can cause bond failure and injury to personnel. Do not count time at temperature below 70°F (21°C) as cure time.

18. Cure repair without heat lamps at 70°F (21°C) for 24 hours .

NOTE

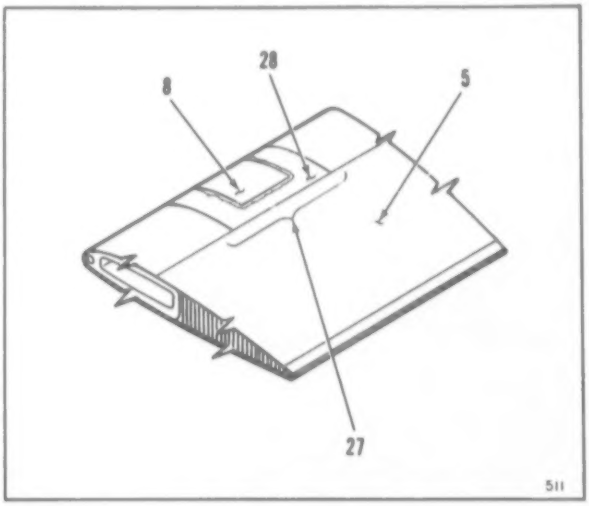
Vacuum source can be removed after 12 hours when repair is cured for 24 hours .

19. **Remove vacuum source.** Remove cargo strap (25), pads (26), wood blocks (24), and polyvinyl sheet (23). Remove masking tape (22), tube (19), sealing tape (21 and 17), masking tape (16), glass cloth (15), and teflon impregnated fabric (14).



20. **Check repair area (27) for adhesive squeezeout.** Check for voids at areas where there is no squeezeout.

21. **Apply bead of sealant (E336) (28)** around doubler (8). Blend sealant to form a smooth gradual fairing from doubler to surface of blade (5). Cure sealant for 24 hours .



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5-66.2 REPAIR TITANIUM NOSE CAP CRACKS (AVIM) (Continued) 5-66.2

22. **Refinish repair area (27)** as follows:

    a. Solvent wipe repair area (27). Use cloth (E120) damp with acetone (E20). Wipe dry. Use clean cloth (E120).

WARNING

Primer (E292) is flammable and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from heat or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

    b. Apply a thin mist coat of primer (E292). Allow to air dry for 1 hour.

WARNING

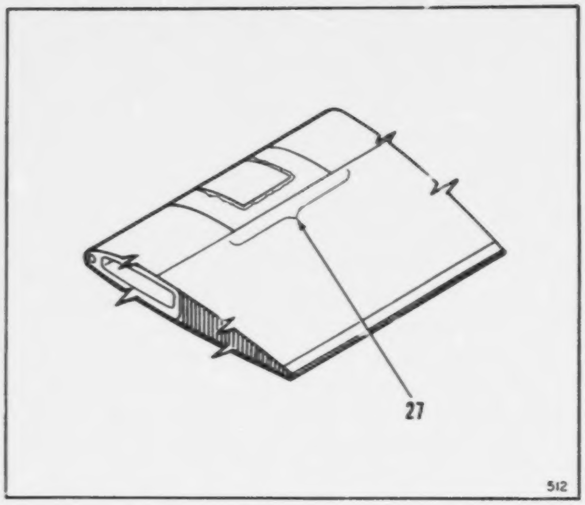
Naphtha (E245) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

CAUTION

Use only aliphatic naphtha TT-N-95 (E245). Other types can contaminate blade surface.

NOTE

If lacquer finish is applied within 2 hours after primer, cleaning with aliphatic naphtha is not required.



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5-66.2 REPAIR TITANIUM NOSE CAP CRACKS (AVIM) (Continued) 5-66.2

c. Within 24 hours after priming, wipe repair area (27). Use clean cloth (E120) damp with aliphatic naphtha (E245). Wipe dry before naphtha evaporates. Use clean cloth (E120).

WARNING

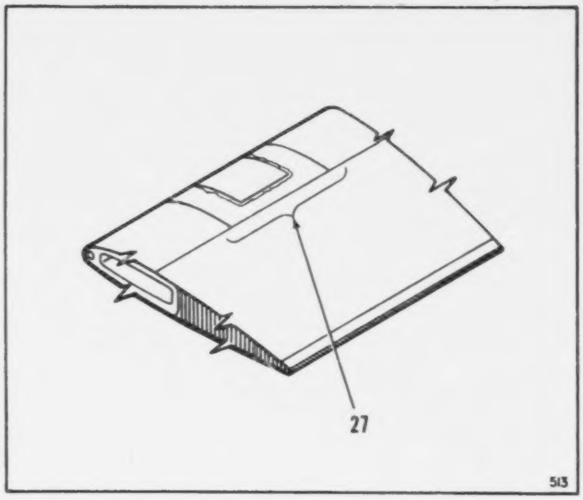
Lacquer (E215) is extremely flammable. It can be toxic. Keep away from heat, sparks, or open flames. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Thinner (E415) is flammable and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from heat or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

d. Thin lusterless black lacquer (E215). Use thinner (E415). Follow manufacturer's instructions.

e. Apply two coats of thinned lacquer (E215) to repair area. Allow to dry 45 minutes between coats.



INSPECT

FOLLOW-ON MAINTENANCE:

Adjust tracking weights (Task 5-82.1).

END OF TASK

5-66.3 TITANIUM NOSE CAP LIGHTNING STRIKE REPAIR 5-66.3

INITIAL SETUP

Applicable Configurations:
All

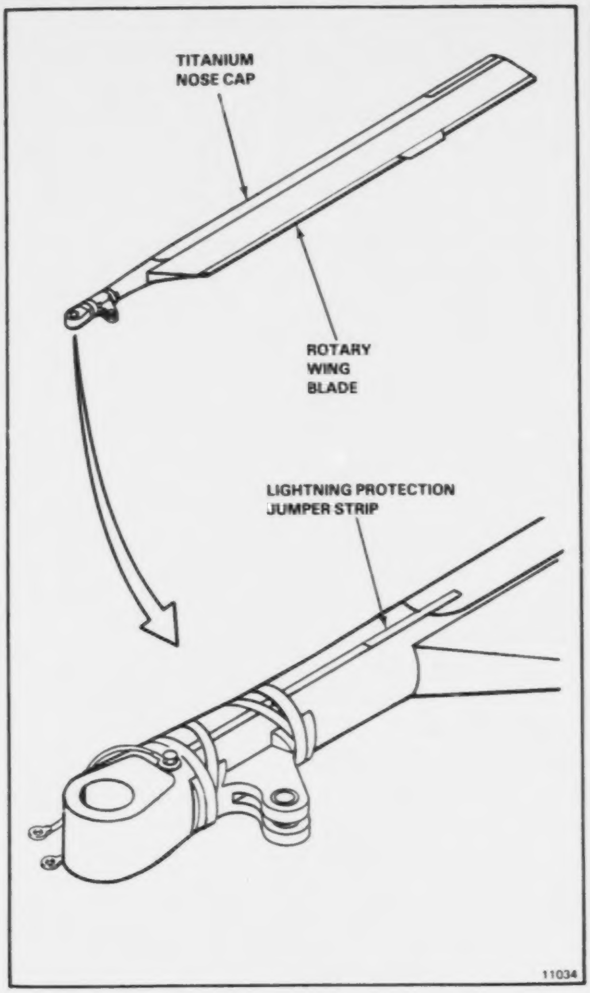
Tools:
Airframe Repairer's Tool Kit,
NSN 5180-00-323-4876
Heat Lamp
Trip Balance NSN 6670-00-401-7195

Materials:
Abrasive Paper (E8 or E9)
Acetone (E20)
Cloths (E120)
Masking Tape (E388)
Adhesive (E40, E41, E43 or E47.1)
Curing Agent (E158.1) or Hardener (E194.1)
Temperature Indicating Strips (E413)
Polyethylene Cup (E157)
Wood Spatula (E424)

Personnel Required:
Aircraft Structural Repairer
Inspector

References:
Task 5-63.1
Task 5-63.2
Task 5-82

Equipment Condition:
Off Helicopter Task



General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Adhesive (E40, E41, E43 or E47.1) is extremely flammable. It is volatile. It forms harmful vapors and explosive peroxides. Keep away from heat, sparks, or open flame. Avoid inhaling. Use only with adequate ventilation.

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5-66.3 TITANIUM NOSE CAP LIGHTNING STRIKE REPAIR (Continued) 5-66.3

CAUTION

Do not use chlorinated solvents on the titanium nose cap or doubler. Contamination of titanium will result in material failure

NOTE

In general, lightning strikes are accompanies by arc burns, delaminations, and fragmented fiberglass in the area of the strike. The lightning protection strip, jumper strips, wire mesh, and jumper wires usually receive the most severe damage.

1. Wipe blade (1) with cloths damp with acetone (E20). Dry with lint-free clean cloth (E120). Inspect and define areas of damage. (Task 63.1 and 63.2).
2. Remove fragments (if any) of fiberglass skin, loose doublers, and other damaged parts.
3. Repair lightning strike damage on titanium nose cap (2) as follows:

   a. **Remove adhesive** where discolored or loose. Use aluminum chisel.

   b. **Inspect wire mesh (3)** and surrounding area.

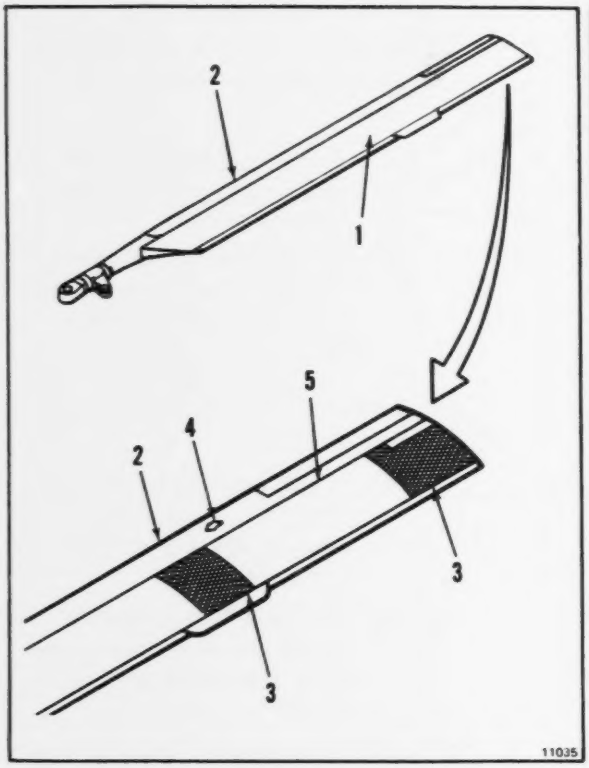
   c. **Blend out damage (4) on nose cap (2).** Remove all signs of burns or discoloration. Make gradual blend over area at least 10 times depth of damage.

   CAUTION

   Do not break fibers of blade skin or damage wire mesh.

   d. **Remove all wire edges and grind marks.** Use abrasive paper (E8 or E9). Sand with spanwise strokes only.

   e. Inspect. There shall be no check marks or chordwise cracks at nose cap trailing edge (5).



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5-66.3 TITANIUM NOSE CAP LIGHTNING STRIKE REPAIR (Continued) 5-66.3

f. **Remove loose particles.** Wipe repair area with cloth (E120) damp with acetone (E20). Wipe dry with clean cloth before acetone evaporates.

g. **Mask blade fairing (6)** at repair area (4). Use masking tape (E388)(7).

h. **Prepare adhesive** (E40, E41 or E47.1) as follows:

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41) only if prepackaged kit is not available.

(1) **Mix tube of adhesive (E40).** Follow instructions on kit.

(2) If adhesive (E40) is not available, prepare adhesive (E41) as follows:

(a) Weigh 100 parts of resin and 23 parts of hardener. Use trip balance.

(b) Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E24).

(3) If adhesive (E47.1) is used, prepare as follows:

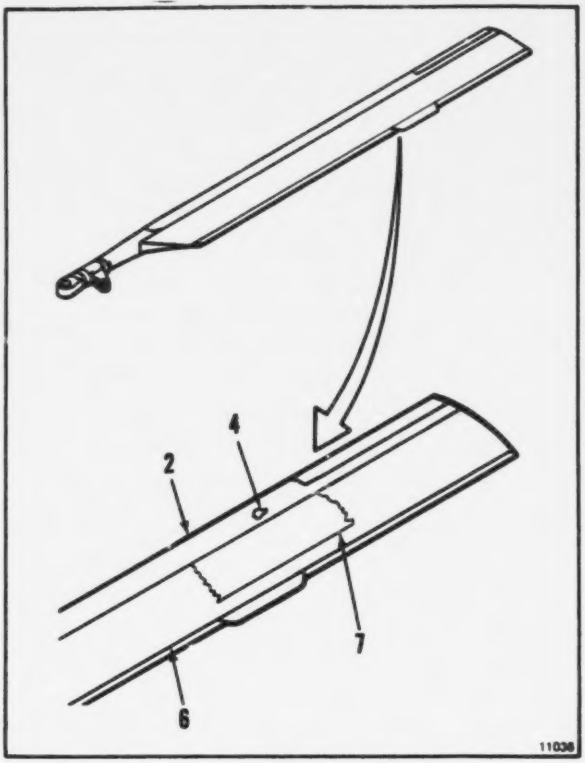
(a) Weigh equal parts of adhesive (E47.1) and curing agent (E158.1 or E199.1) use trip balance.

(b) Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

i. **Fill repair area (4)** with adhesive. Fair adhesive to surrounding surface of nose cap (2).

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.



j. Cure adhesive at 150° to 160°F (66° to 71°C) 2 hours . Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70° to 80°F (21° to 27°C) in 24 hours .

k. **Refinish repair area** (4) (Task 5-82).

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5-66.3 TITANIUM NOSE CAP LIGHTNING STRIKE REPAIR (Continued) 5-66.3

3. Repair damage to nose cap (2) under jumper strip (8) as follows:

   a. **Remove jumper strip** (8). Use aluminum chisel.

   CAUTION

   Do not break fibers of the fairing skin.

   b. **Remove damage on nose cap (2)**. Use a grinder. Edge of hose cap can be scalloped to full depth if required. Use a 1 inch diameter grinder.

   c. **Smooth edge of repair.** Use abrasive paper (E8 or E9). Sand in spanwise direction only.

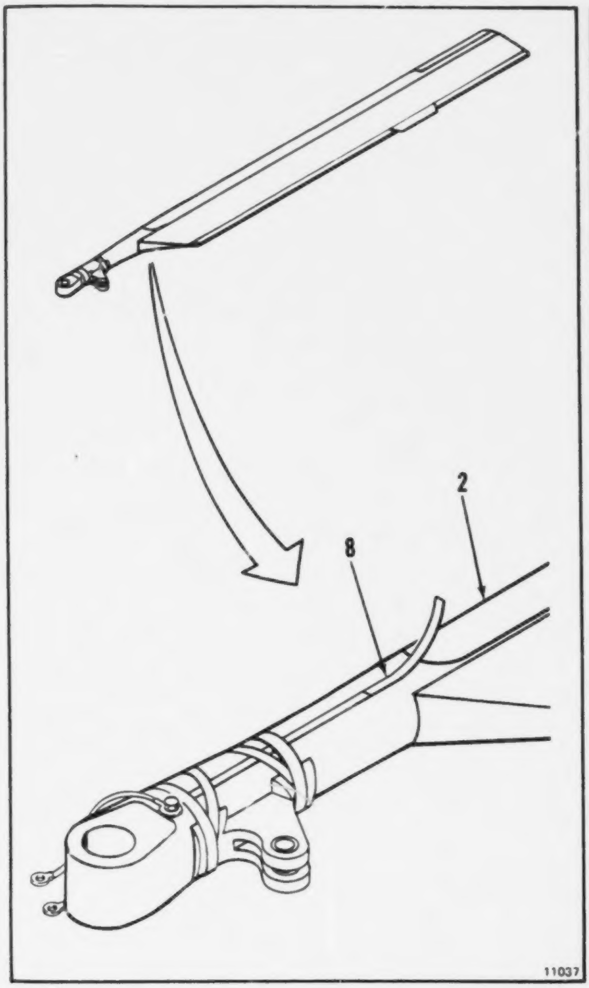
   d. **Wipe repair area.** Use cloth (E20) damp with acetone (E120). Wipe dry with clean cloth before acetone evaporates.

   e. **Mix adhesive** as follows:

      (1) Weigh 7 parts of gray hardener and 5 parts of white base. Use tip balance.

      (2) Mix in polyethylene cup (E157) until color is uniform. Use wood spatula (E424)

   f. **Fill blended area** with adhesive (E43).



INSPECT

FOLLOW-ON MAINTENANCE:

Replace Jumper Strip (Task 5-81.3.1)

Refinish repair area (Task 5-82)

END OF TASK

5-66.4 REPAIR ROOT END SLOT SEAL 5-66.4

INITIAL SETUP

Applicable Configurations:
All

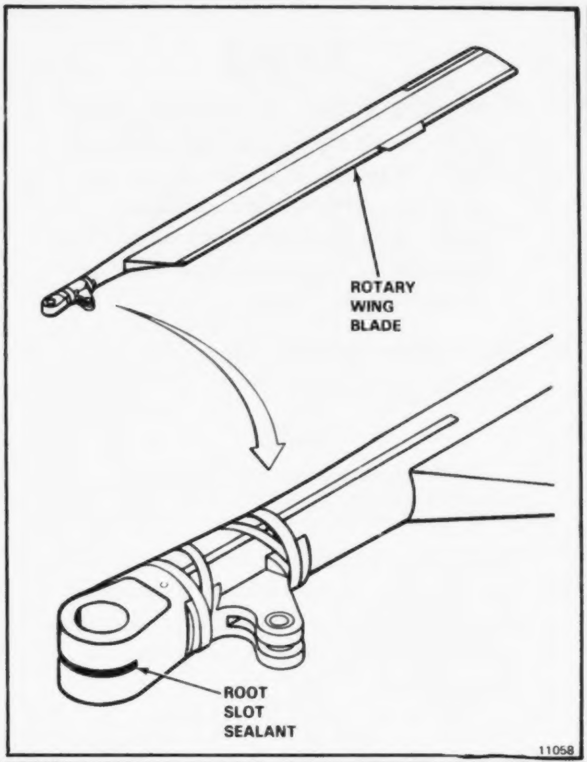
Tools:
Airframe Repairer's Tool Kit,
NSN 5180-00-323-4876
Heat Lamp

Materials:
Abrasive Paper (E7 and E9)
Acetone (E20)
Cloth (E120)
Sealant (E336)
Teflon Tape (E399)
Temperature Indicating Strips (E413)

Parts:
Root End Slot Seal 114R1779-1

Personnel Required:
Aircraft Structural Repairer
Inspector

Equipment Condition:
Off Helicopter Task

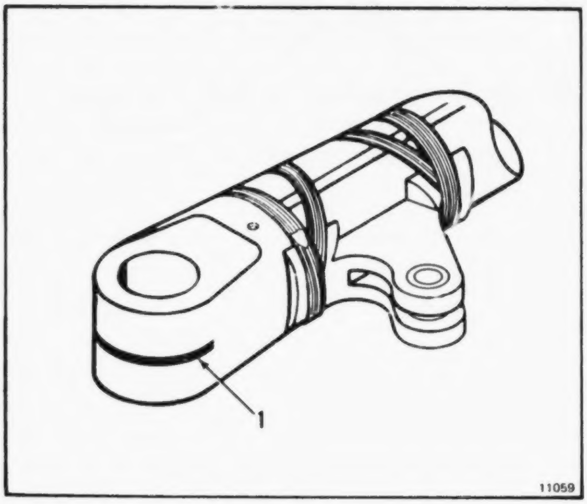


1. **Remove finish** from root end to a distance of 1 inch all around root slot sealant (1). Use abrasive paper (E7).
2. **Remove root slot sealant (1).** Use utility knive and chisel.

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. **Clean repair area.** Use clean cloth (E120) damp with acetone (E20). Wipe dry before acetone evaporates. Use clean dry cloth.



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5-66.4 REPAIR ROOT END SLOT SEAL (Continued) 5-66.4

WARNING

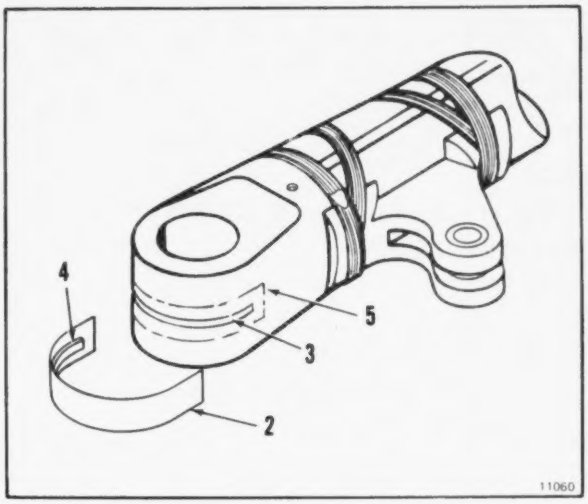
Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

4. **Mix sealant (E336)** in accordance with the manufacturer's instructions.

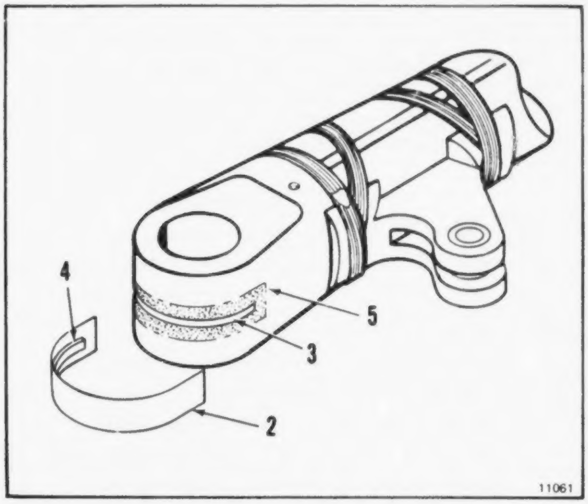
NOTE

Working life of sealant (E336) is about 30 minutes.

5. Temporarily fit root slot seal (2) in open root slot (3). Note amount of gap between ends of slot filler (4) and ends of root slot. Draw outline (5) of slot seal (2) on blade root. Remove seal (2).



6. **Apply sealant** to area within outline (5). Apply sealant at ends of root end slot (3) to completely fill gap between slot and end of filler (4).



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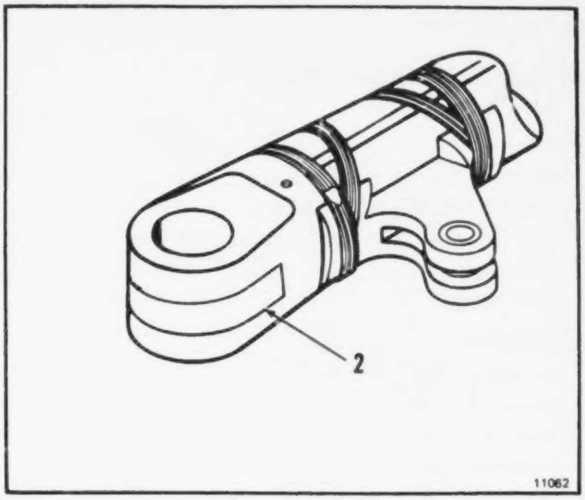
5-66.4 REPAIR ROOT END SLOT SEAL (Continued) 5-66.4

7. **Install end slot seal (2).** Press edges of seal firmly onto sealant. Use additional sealant (E336) to fair end slot seal to surrounding surface.



8. **Cover repair area** with teflon tape (E399) (6).

CAUTION

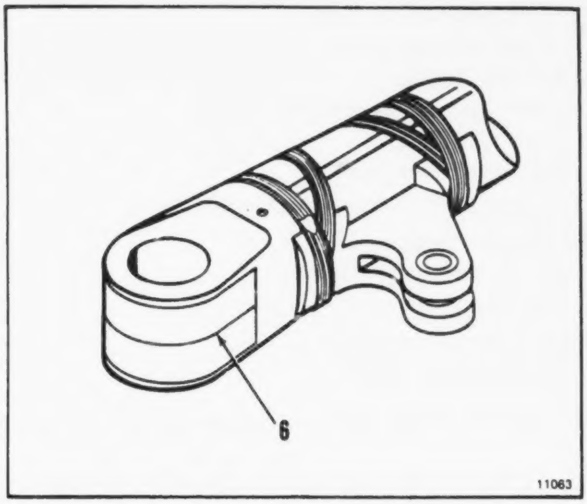
Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass blade can occur.

9. **Cure adhesive** at 120°F to 130°F (49°C to 55°C) for 1 hour. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved at 70°F to 80°F (21°C to 27°C) in 6 hours.

10. Remove teflon tape (6) when cure is completed.



INSPECT

FOLLOW-ON MAINTENANCE:

Refinish repair area (Task 5-82).

END OF TASK

5-67 REPAIR BLADE SPAR ROOT END MINOR DAMAGE

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Trip Balance, NSN 6670-00-401-7195
Shot Bag
Heat Lamp

Materials:

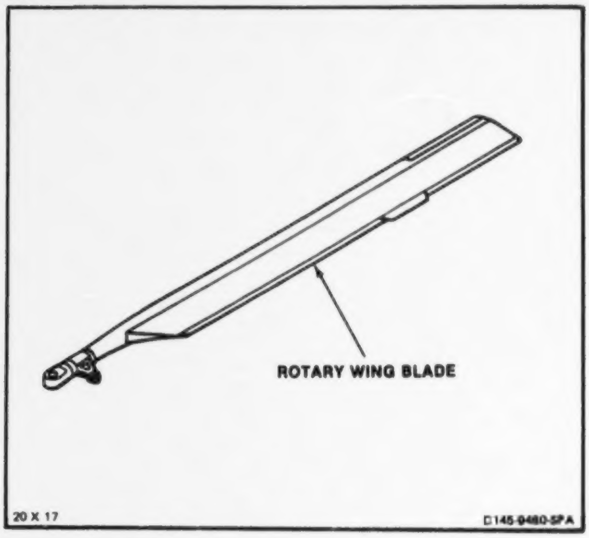
Abrasive Paper (E7 and E9)
Gloves (E186)
Cloth (E120)
Acetone (E20)
Adhesive (E40) or (E41)
Polyethylene Cup (E157)
Wood Spatula (E424)
Peel Ply (E270)
Teflon-Impregnated Fabric (E170)
Tape (E388)
Silicone Rubber (E318)
Temperature Indicating Strips (E413)

Personnel Required:

Aircraft Structure Repairer
Inspector

Equipment Condition:

Off Helicopter Task



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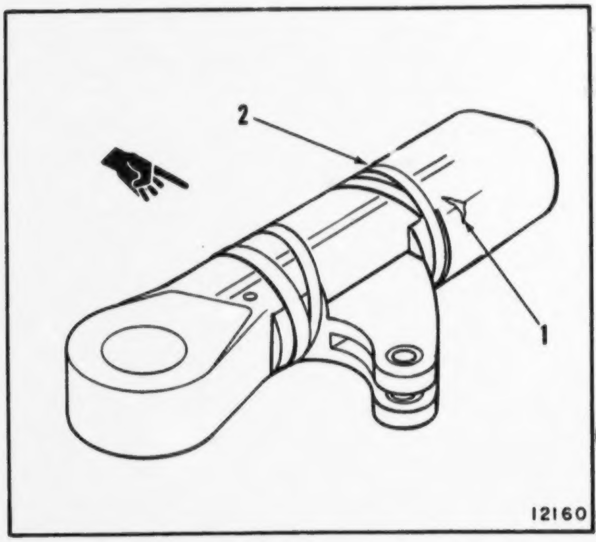
1. **Prepare damaged area (1) of spar (2)** as follows:
   a. Remove damaged fiberglass. Use file. Do not exceed depth of damage. Taper edges 10 times depth of damage.
   b. Check damaged area. Damaged area shall not exceed four plies (0.072 inch) in depth.



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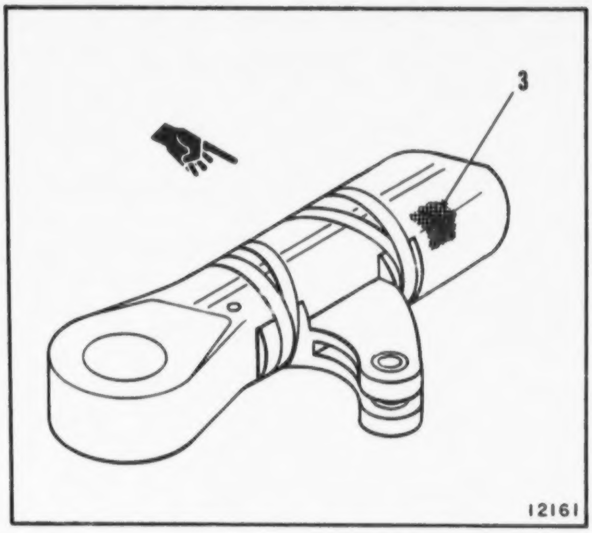
5-67 REPAIR BLADE SPAR ROOT END MINOR DAMAGE (Continued) 5-67

c. Remove finish to a distance of 1 inch all around damaged area (1). Use abrasive paper (E7).

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

d. Clean area (3) where finish was removed. Use cloth (E120) damp with acetone (E20). Wear gloves (E186). Wipe acetone dry immediately. Use dry cloth (E120).



2. **Mix adhesive (E40) or (E41)** as follows:

WARNING

Adhesives (E40) and (E41) are flammable and toxic. Avoid inhaling. Use only with adequate ventilation. Keep away from heat, sparks, or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

NOTE

Adhesive (E40) is preferred. Use adhesive (E41) only if adhesive (E40) is not available.

a. Mix a tube of prepackaged adhesive (E40). Follow instructions on kit. Wear gloves (E186).

b. If prepackaged adhesive (E40) is not available, prepare adhesive (E41). Mix 100 parts of resin and 23 parts of hardener by weight. Use trip balance and polyethylene cup (E157). Stir until color is uniform. Use tongue depressor (E424).

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3. **Repair damaged area (1)** as follows:

NOTE

Working life of adhesive mixture is 30 minutes.

   a. Fill damaged area (1). Use adhesive (E40) or (E41).
   b. Fair adhesive flush with area (3) around damaged area (1). Use tongue depressor (E424).
   c. Cut silicone rubber (E318) (4), peel ply (E270) (5), and Teflon-impregnated fabric (E170) (6) 1 inch larger, on all sides, than area (3).
   d. Cover area (3). Use peel ply (E270.1) (5) and Teflon-impregnated fabric (E170) (6).
   e. Place silicone rubber (E318) (4) over Teflon-impregnated fabric (E170) (6). Bend rubber to blade spar contour.
   f. Press silicone rubber (E318) (4) down. Wrap tape (E388) (7) around blade spar (2) over rubber. Position shot bag (8) over tape.

CAUTION

Blade temperature must not exceed 160°F (71°C). Overheating will damage fiberglass.

4. Cure repair at 140°F (60°C) to 160°F (71°C) for 2 hours. Use heat lamp. Monitor blade temperature. Use temperature indicating strips (E413).

NOTE

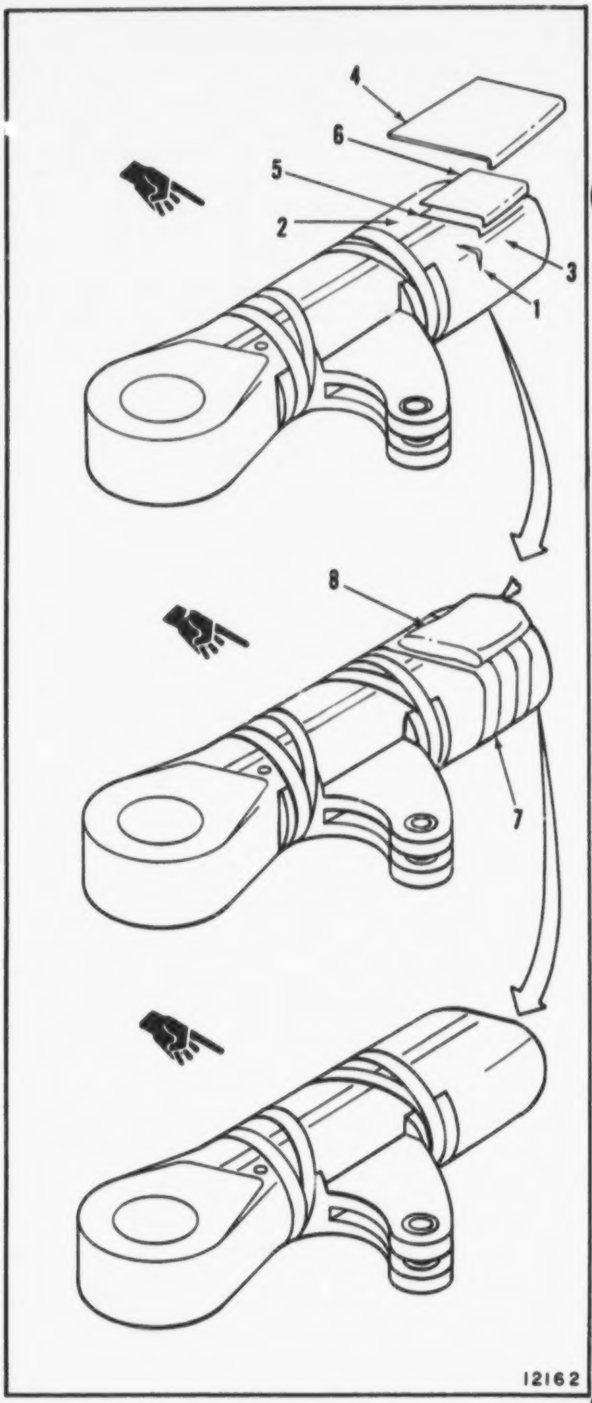
If heat lamp is not available, cure at 70° to 80°F (21° to 27°C) for 24 hours. Shot bag can be removed after 12 hours.

5. Remove shot bag (8), tape (7), rubber (E318) (4), and Teflon-impregnated fabric (E170) (6).
6. **Blend repaired area.** Use abrasive paper (E9).

INSPECT

FOLLOW-ON MAINTENANCE:

Refinish blade (Task 5-82).



END OF TASK

5-67.1 REPAIR BLADE SPAR ROOT END — MAJOR DAMAGE 5-67.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

- Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
- Scissors
- Vacuum Pump
- Trip Balance, NSN 6670-00-401-7195
- Heat Lamp
- Respirator

Materials:

- Acetone (E20)
- Gloves (E186)
- Abrasive Paper (E7 and E9)
- Masking Tape (E388)
- Cloth (E120)
- Adhesive (E40, E41, E43 or E47.1)
- Polyethylene Cup (E157)
- Wood Spatula (E424)
- Peel Ply (E270)
- Teflon Impregnated Fabric (E170)
- Rubber Pad (E318)
- Glass Cloth (E132)
- Sealing Tape (E396)
- Polyvinyl Sheet (E284)
- Temperature Indicating Strips (E413)
- Fiberglass Laminate (E168)
- Curing Agent (E158.1)

Personnel Required:

- Aircraft Structural Repairer
- Inspector

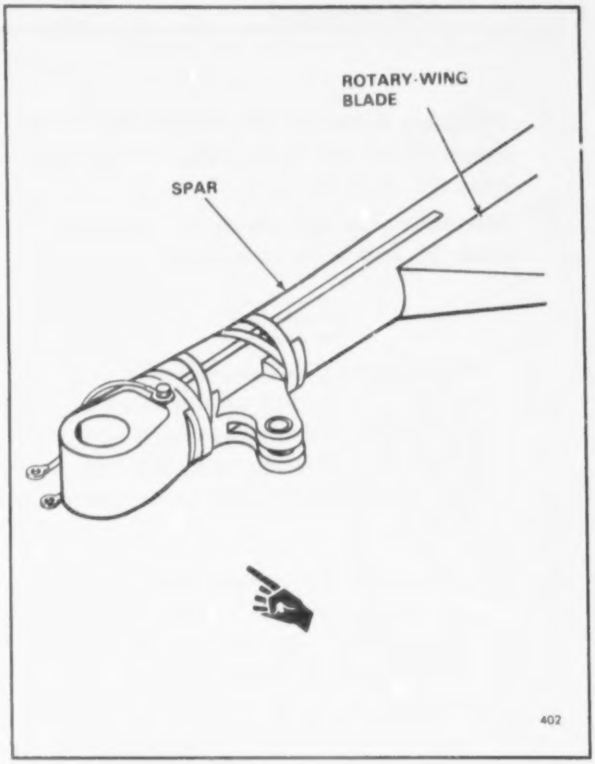
Equipment Condition:

Off Helicopter Task

General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



WARNING

Adhesives (E40, E41, E43,and E47.1) are toxic. They can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

GO TO NEXT PAGE

5-67.1 REPAIR BLADE SPAR ROOT END — MAJOR DAMAGE (Continued) 5-67.1

1. **Measure distance from root end (1) of blade (2) to outboard edge of damage area (3).** Note distance.
2. **Measure size and depth of damage area (3),** and proceed as follows:

WARNING

If damage is as described in steps a, b, d, or f, repair is not authorized at this maintenance level. Unauthorized repairs can cause loss of helicopter and loss of life.

a. If distance A is greater than 51 inches , or damage area (3) is greater than 1 square inch , the blade is not reparable at this level of maintenance.

b. If damage area (3) is within distance B, and is greater than 0.108 inch deep, the blade is not reparable at this level of maintenance.

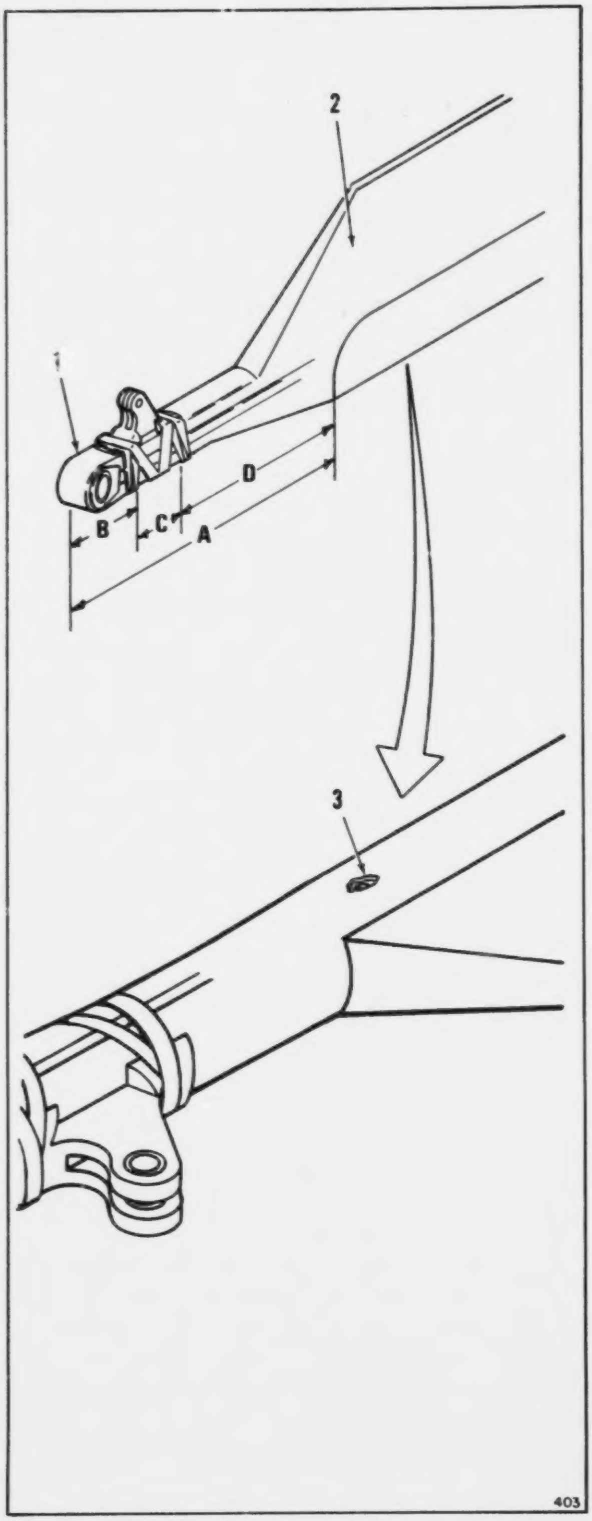
c. If damage area (3) is within distance B, and is less than 0.108 inch deep, go to step 3.

d. If damage area (3) is within distance C, and is greater than 0.090 inch deep, the blade is not reparable at this level of maintenance.

e. If damage area (3) is within distance C, and is less than 0.090 inch deep, go to step 3.

f. If damage area (3) is within distance D, and is greater than 0.072 inch , the blade is not reparable at this maintenance level.

g. If damage area (3) is within distance D, and is less than 0.072 inch , go to step 3.



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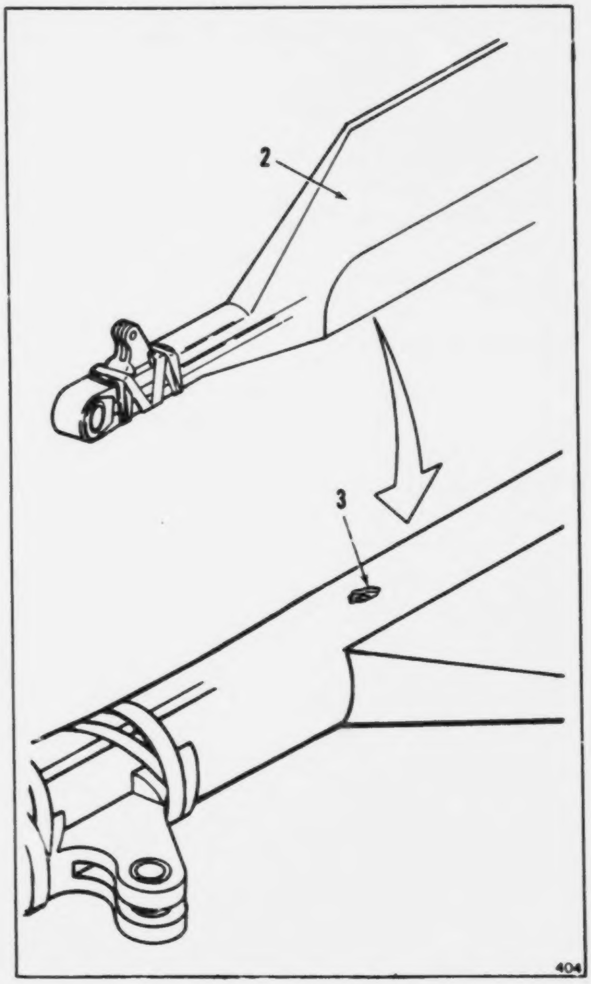
5-67.1 REPAIR BLADE SPAR ROOT END — MAJOR DAMAGE (Continued) 5-67.1

3. **Remove glass fibers from damage area (3).** Use file. Do not file deeper than damage. Taper sides of damage to 10 times depth.
4. **Check damage area (3)** after loose fibers are removed. If damage is less than 5 plies , and the area does not exceed 10 square inches, go to Task 5-67. If damage is 5 or more plies , check that it does not exceed the limits in step 2.
5. **Remove finish 1 inch around all sides of damage area (3).** Use abrasive paper (E7). If needed, soften finish. Use clean cloth (E120) damp with acetone (E20). Wear gloves (E186).
6. **Clean blade (2) 7 inches around all sides of damage area (3).** Use cloth (E120) damp with acetone (E20). Wipe dry immediately. Use dry cloth (E120).



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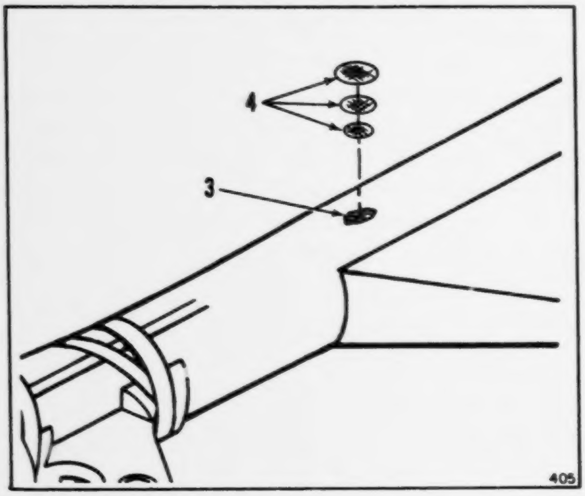
5-67.1 REPAIR BLADE SPAR ROOT END — MAJOR DAMAGE (Continued) 5-67.1

7. **Cut patches (4)** from glass cloth (E132) to fit inside damage area (3). Size patches to overlap.



NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41, E43 or E47.1) only if prepackaged kit is not available.

8. **Mix tube of adhesive (E40).** Follow instructions on kit.
9. If adhesive (E40) is not available, prepare adhesive (E41) as follows:
   a. Weigh 100 parts of resin and 23 parts of hardener. Use trip balance.
   b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

NOTE

Working life of adhesive is 30 minutes .

9.1 If adhesive (E43) is used, prepare as follows:
   a. Weigh 7 parts of gray hardener and 5 parts of white base. Use trip balance.
   b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

9.2 If adhesive (E47.1) is used, prepare as follows:
   a. Weigh equal parts of adhesive (E47.1) and hardener (E194.1). Use trip balance.
   b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

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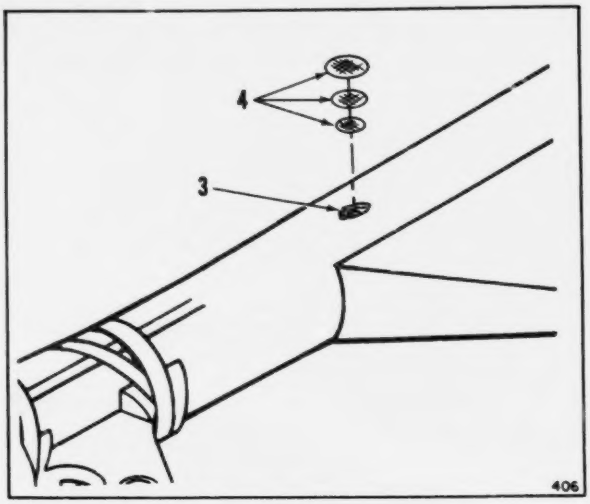
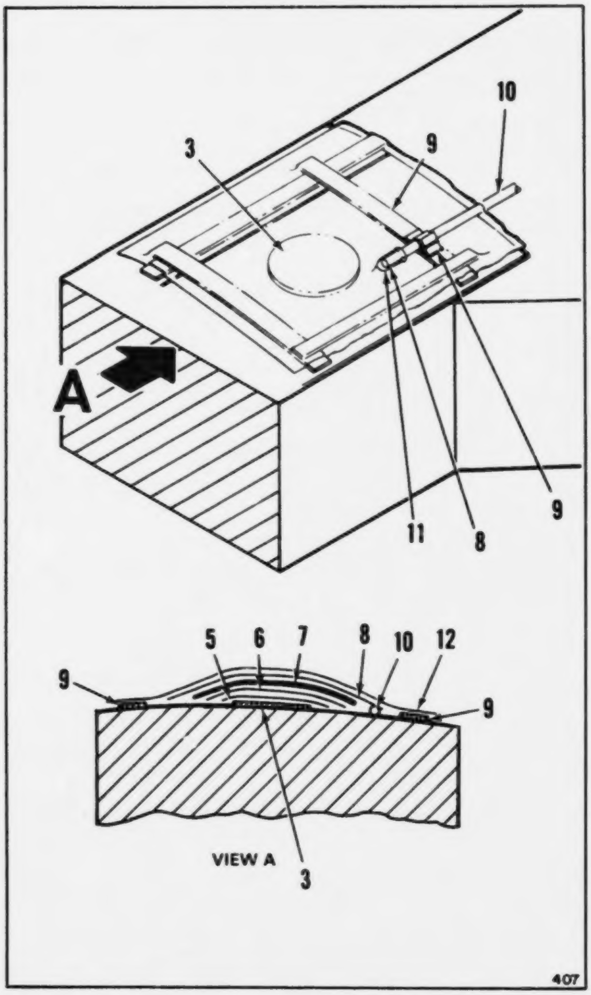
5-67.1 REPAIR BLADE SPAR ROOT END — MAJOR DAMAGE (Continued) 5-67.1

10. **Apply** a layer of **adhesive** (E40, E41, E43 or E47.1) to damage area (3). **Position smallest patch (4)** at bottom of damage area.

11. **Continue to apply layers of adhesive and patches (4).** Overlap each patch with a larger patch. Be sure patches are soaked with adhesive. Cover the top patch with adhesive.



12. **Bond repair area (3)** as follows:
    a. Cover repair with layer of peel ply (E270) (5) and layer of teflon-impregnated fabric (E170) (6). Make layers large enough to overlap patch (3) 1 inch.
    b. Cover teflon-impregnated fabric (E170) (6). Use thick rubber pad (E318) (7).
    c. Cover repair area. Use fiberglass cloth (E132) (8). Cut cloth large enough to cover rubber pad (E318) (7).
    d. Surround cloth (E132) (8) with sealing tape (E396) (9). Keep tape clear of cloth.
    e. Attach tube (10) to vacuum pump hose.
    f. Wrap tube (10). Use two layers of fiberglass cloth (E132) (8). Apply masking tape (E388) (11) over cloth.
    g. Position tube (10) on cloth (E132) (8) covering repair. Wrap tube with sealing tape (E396) (9) where tube crosses sealing tape (9) already applied.
    h. Press tube (10) onto tape (9) to make airtight seal.
    i. Press polyvinyl sheet (E284) (12) smoothly onto tape (9) to make airtight seal.
    j. Start vacuum pump. Check for leaks. Reposition polyvinyl sheet (E284) (12) or add tape (E396) (9) as needed.
    k. Maintain 20 inches Hg vacuum through adhesive cure.



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5-67.1 REPAIR BLADE SPAR ROOT END — MAJOR DAMAGE (Continued) 5-67.1

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.

l. Cure adhesive at 140° to 160°F (60° to 71°C) 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70° to 80°F (21° to 27°C) in 24 hours. Vacuum may be removed after 12 hours.

m. Turn off vacuum pump.

n. Remove peel ply (5), fabric (6), rubber (7), fiberglass (8), tape (9), tube (10), and sheet (12).

o. If squeezeout fairing is not satisfactory, fair patch. Use adhesive (E40, E41, E43 or E47.1). Follow steps 8 or 9 to mix adhesive.

WARNING

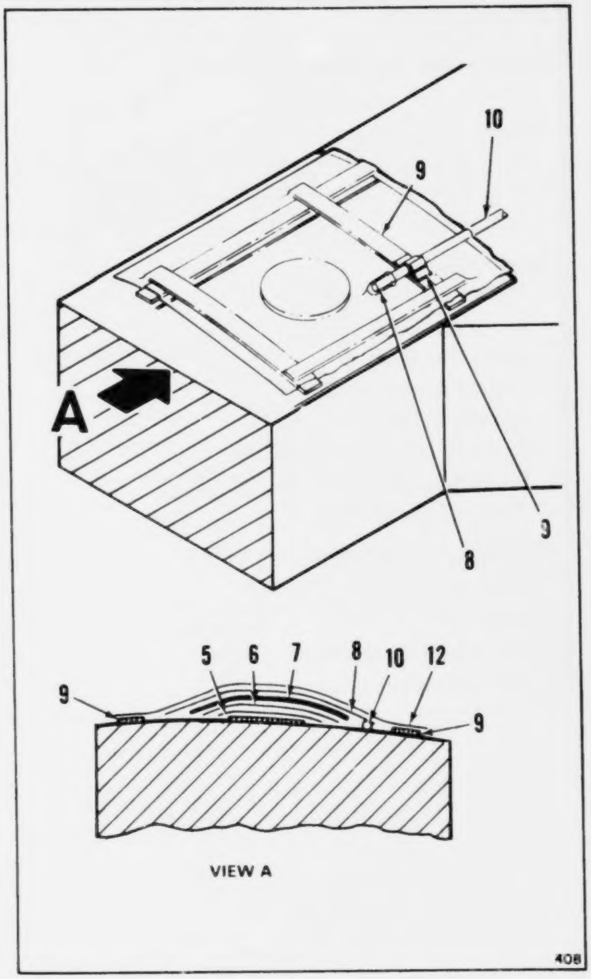
Harmful adhesive particles can be inhaled if respirator is not worn during sanding.

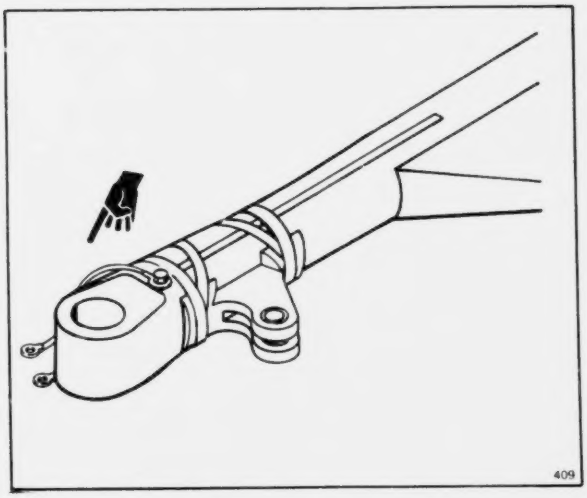
13. Sand the repair as necessary to blend with the surrrounding area. Use abrasive paper (E9). Wear a respirator.

INSPECT

FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).





END OF TASK

5-67.1.1 REPAIR BLADE SHANK VOIDS 5-67.1.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Source of Compressed Air
Trip Balance, NSN 6670-00-401-7195
Hand Drill

Materials:

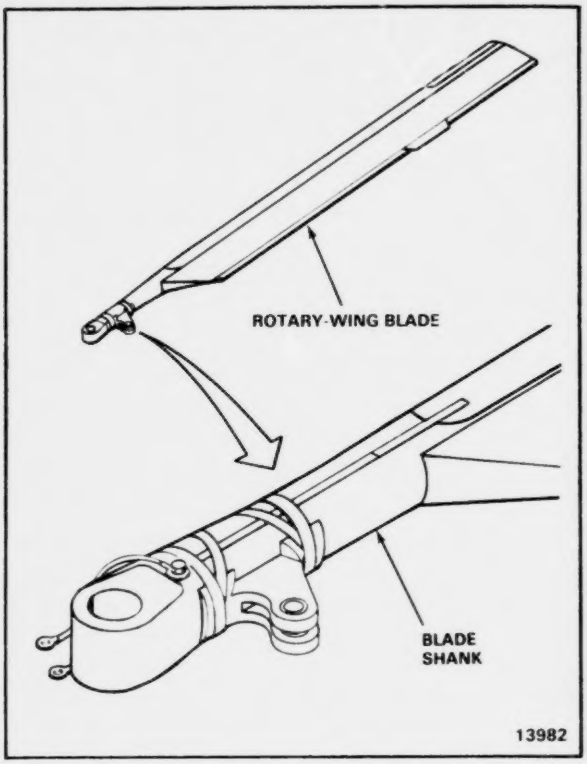
Marking Pencil (E271)
Acetone (E20)
Adhesive (E63.2)
Curing Agent (E158.1)
Gloves (E186)
Hypodermic Syringe (E380)
Polyethylene Cup (E157)
Teflon Tape (E399)

Personnel Required:

Aircraft Structural Repairer
Inspector

Equipment Condition:

Off Helicopter Task



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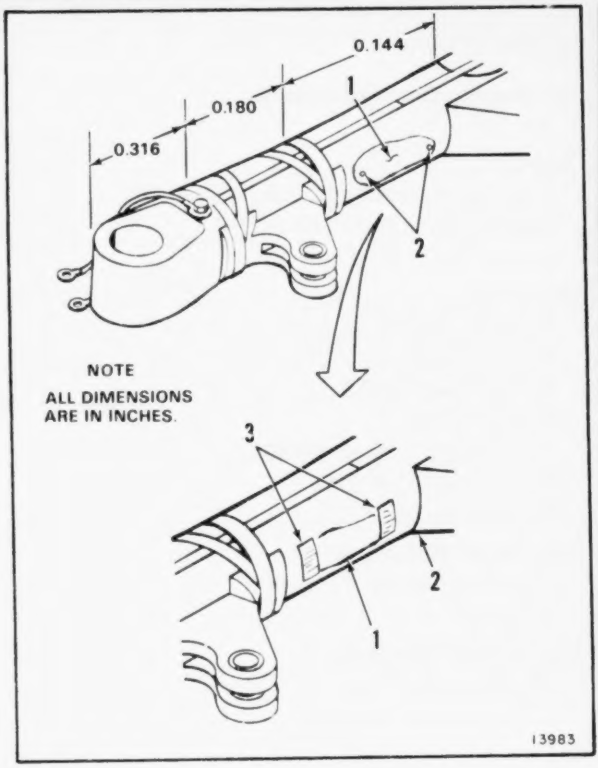
5-67.1.1 REPAIR BLADE SHANK VOIDS (Continued) 5-67.1.1

1. **Determine size of void (1).** Use coin tapping (Task 5-63.1). Outline void area with a marking pencil (E271).
2. **Drill a hole (2)** through unbonded material at each end of void (1). Do not drill past void. Use a No. 40 drill bit and a hand drill. Set drill depth so that the dimensions noted in the illustration will not be exceeded in the areas shown.
3. Blow air at no more than 20 psig into one hole (2). **Check that air escapes** from the other hole. If not, drill more holes so that air will pass through void (1).
4. **Clean void (1).** Use acetone (E20) from a plastic squeeze bottle (E366). Flush void until acetone runs clear.

CAUTION

Exceeding 20 psig may damage blade.

5. **Blow clean dry air through void (1)** to clear it of acetone. Do not exceed 20 psig.
6. Prepare an adhesive mixture as follows:
   a. Weigh 2 parts of adhesive (E63.2) and 1 part curing agent (E158.1). Use a trip balance.
   b. Mix in polyethylene cup (E157). Use wood spatula (E424).
7. **Inject adhesive** into void (1) through one hole (2). Use a hypodermic syringe (E380). When void is full, shown by adhesive coming out the other hole, cover all holes. Use tape (E399) (3).
8. Let adhesive cure for 36 hours at 70° to 80°F (21° to 27°C).
9. Remove tape (3).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-67.1.2 REPAIR SOCKET LINER VOIDS 5-67.1.2

INITIAL SETUP

Applicable Configurations:

All

Tools:

Trip Balance, NSN 6670-00-401-7195
Vertical Hinge Pin 114R2172-1
Source of Compressed Air

Materials:

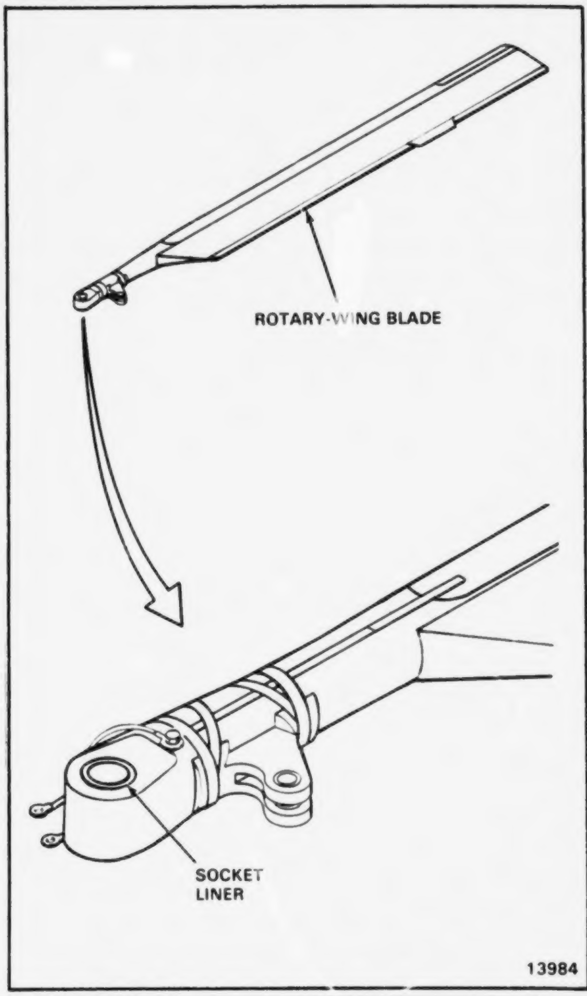
Acetone (E20)
Adhesive (E63.2)
Curing Agent (E158.1)
Gloves (E186)
Hypodermic Syringe (E380)
Polyethylene Cup (E157)
Teflon Tape (E399)

Personnel Required:

Aircraft Structural Repairer
Inspector

Equipment Condition:

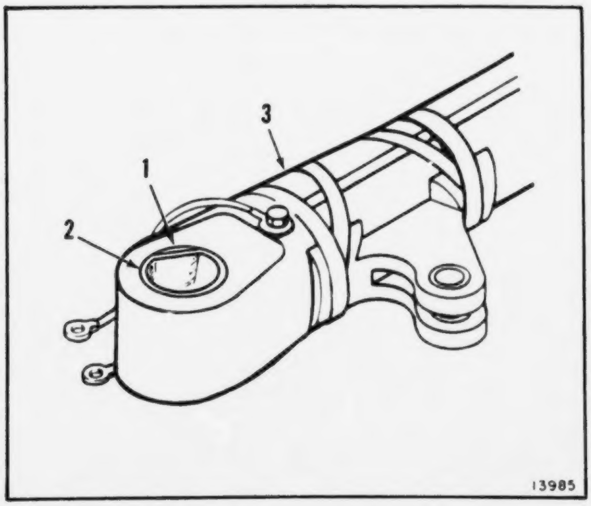
Off Helicopter Task



NOTE

Repair bond voids only if they extend to edge of liner.

1. **Open void (1)** at edge of liner (2). Use clean 0.005 inch thick shim stock.
2. **Position blade (3)** so that open end of void (1) is lower than closed end.



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5-67.1.2 REPAIR SOCKET LINER VOIDS (Continued) 5-67.1.2

WARNING

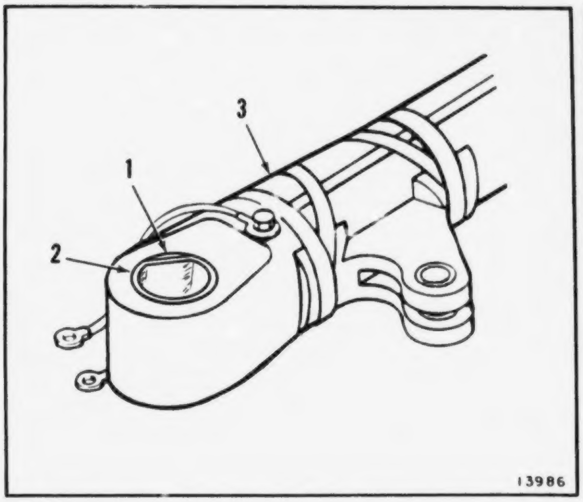
Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. **Clean void (1).** Use acetone (E20) from a plastic squeeze bottle (E366). Flush void until acetone runs clear.

CAUTION

Exceeding 20 psig may damage blade.

4. **Blow out excessive acetone** with compressed air. Do not exceed 20 psig. Allow to dry for 15 minutes.
5. Prepare an adhesive mixture as follows:
   a. Weigh 2 parts of adhesive (E63.2) and 1 part curing agent (E158.1). Use a trip balance.
   b. Mix in polyethylene cup (E157). Use wood spatula (E424).
6. **Inject adhesive mixture** into void (1). Use a hypodermic syringe (E380). Fill deepest part of void first to avoid trapping air.
7. **Close void (1).** Press liner (2) against bore of blade (3) by hand. Remove excess adhesive with cloth (E120).
8. Cover area of adhesive squeezeout with Teflon tape (E399). Install vertical pin.
9. Let adhesive cure for 36 hours at 70° to 80°F (21° to 27°C).
10. Remove vertical pin. Remove Teflon tape.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-67.2 REPAIR BLADE FAIRING SKIN DAMAGE 5-67.2

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer Tool Kit, NSN 5180-00-323-4876
Scissors
Sanding Block
Pencil Compass
Vacuum Pump
Protective Clothing
Respirator
Trip Balance, NSN 6670-00-401-7195
Heat Lamp

Materials:

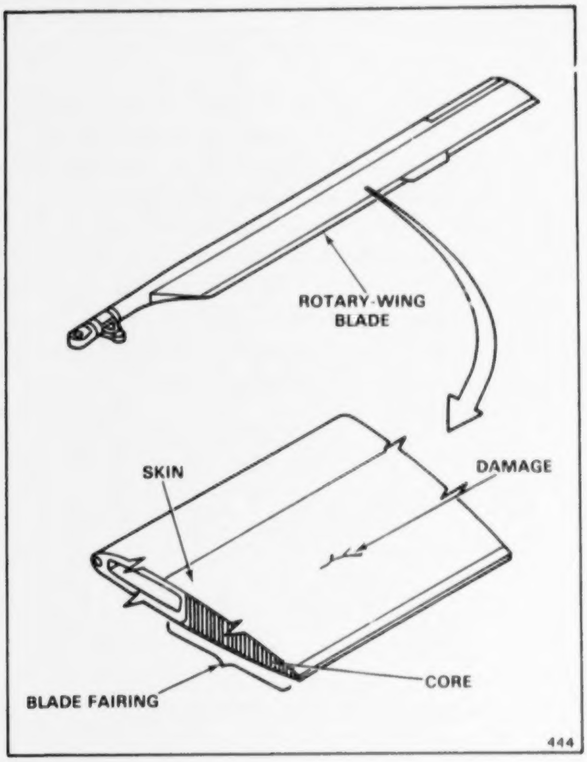
Wire Mesh (E453)
Acetone (E20)
Gloves (E186)
Abrasive Paper (E6), (E7), (E9)
Masking Tape (E388)
Cloth (E120)
Adhesive (E40 or E41)
Polyethylene Cup (E157)
Tongue Depressor (E424)
Peel Ply (E270)
Teflon Impregnated Fabric (E170)
Rubber Pad (E318)
Glass Cloth (E132)
Sealing Tape (E396)
Polyvinyl Sheet (E284)
Temperature Indicating Strips (E413)
Fiberglass Laminate (E168 or E168.1)

Personnel Required:

Aircraft Structural Repairer
Inspector

Equipment Condition:

Off Helicopter Task



General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

WARNING

Adhesive (E40 or E41) is extremely flammable. It is volatile. It forms harmful vapors and explosive peroxides. Keep away from heat, sparks, or open flame. Avoid inhaling. Use only with adequate ventilation.

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5-67.1 REPAIR BLADE SPAR ROOT END — MAJOR DAMAGE (Continued) 5-67.1

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.

l. Cure adhesive at 140° to 160°F (60° to 71°C) 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70° to 80°F (21° to 27°C) in 24 hours. Vacuum may be removed after 12 hours.

m. Turn off vacuum pump.

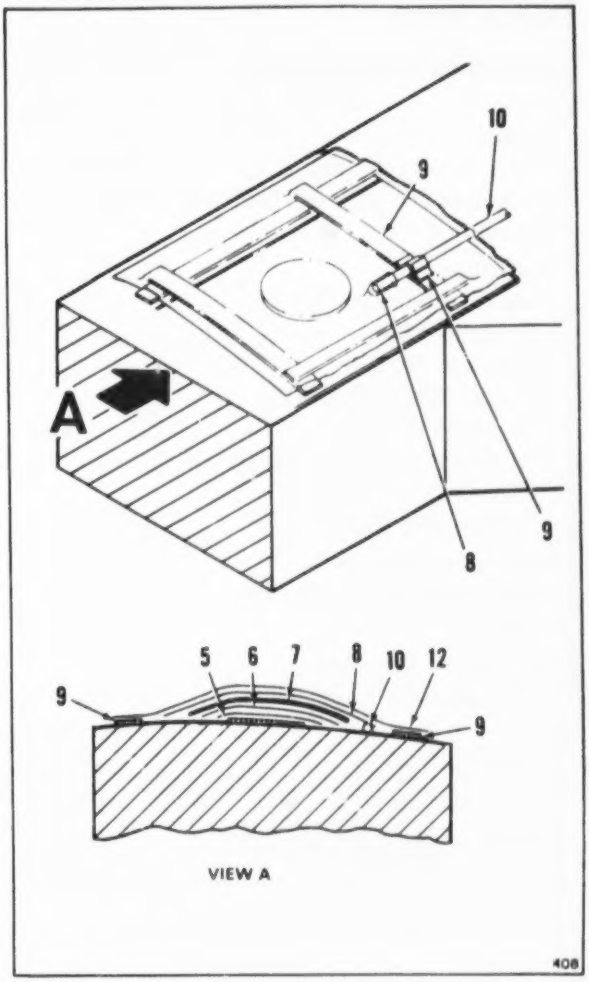
n. Remove peel ply (5), fabric (6), rubber (7), fiberglass (8), tape (9), tube (10), and sheet (12).

o. If squeezeout fairing is not satisfactory, fair patch. Use adhesive (E40, E41, E43 or E47.1). Follow steps 8 or 9 to mix adhesive.

WARNING

Harmful adhesive particles can be inhaled if respirator is not worn during sanding.

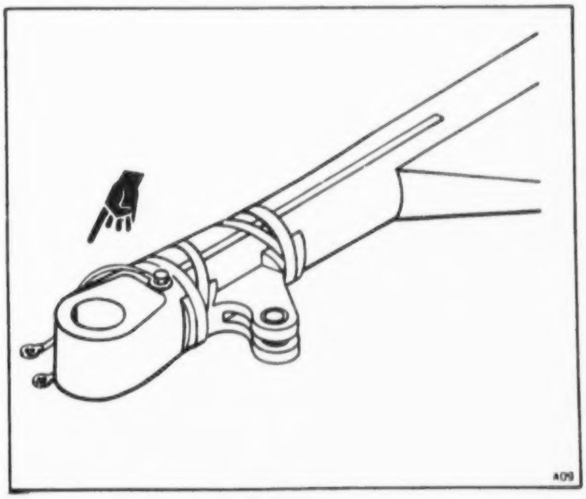
13. Sand the repair as necessary to blend with the surrrounding area. Use abrasive paper (E9). Wear a respirator.



INSPECT

FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).



END OF TASK

5-67.1.1 REPAIR BLADE SHANK VOIDS 5-67.1.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Source of Compressed Air
Trip Balance, NSN 6670-00-401-7195
Hand Drill

Materials:

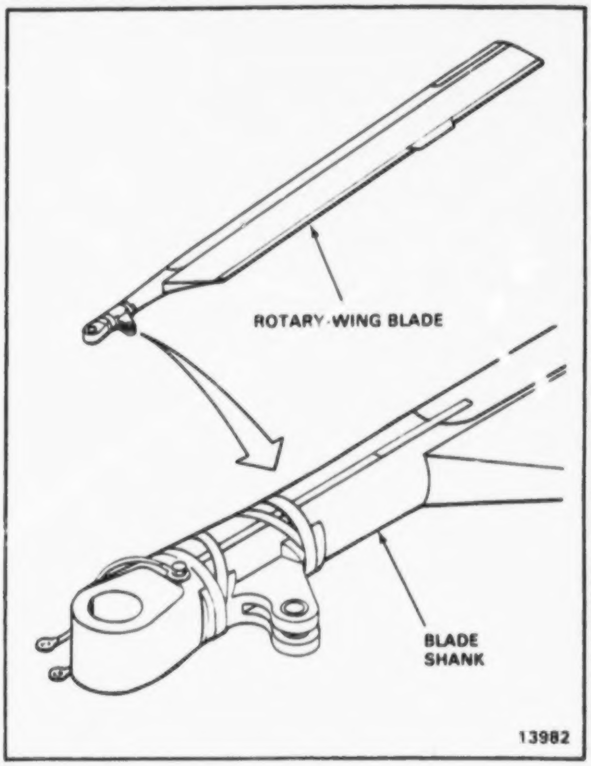
Marking Pencil (E271)
Acetone (E20)
Adhesive (E63.2)
Curing Agent (E158.1)
Gloves (E186)
Hypodermic Syringe (E380)
Polyethylene Cup (E157)
Teflon Tape (E399)

Personnel Required:

Aircraft Structural Repairer
Inspector

Equipment Condition:

Off Helicopter Task



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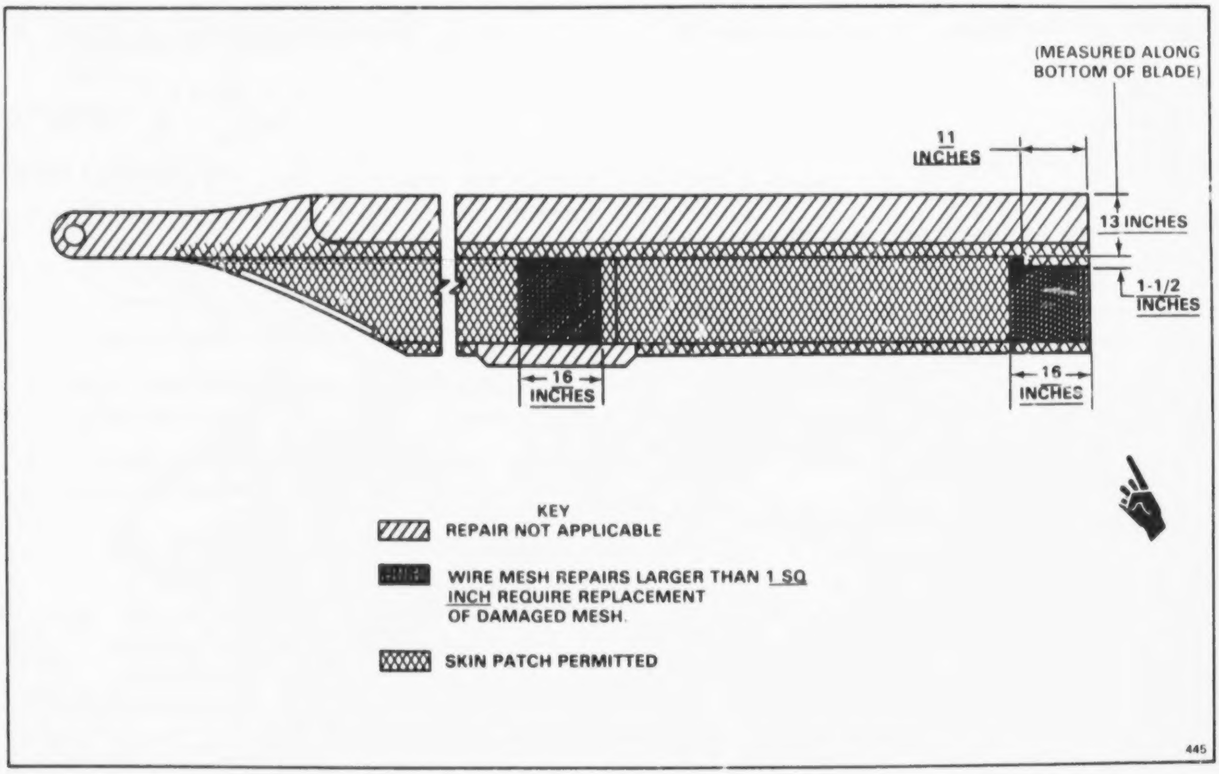
5-67.2 REPAIR BLADE FAIRING SKIN DAMAGE (Continued) 5-67.2

PREPARE DAMAGE AREA

1. **Check location and extent of damage** to skin. **Refer to Fiberglass Skin Damage Repair Limits figure.** Skin must be patched where repairs are allowed. If damage extends into honeycomb core, repair fairing (Tasks 5-68, 5-69, or 5-70)

NOTE

Skin patch can overlap blade spar aft of titanium nose cap.


(MEASURED ALONG BOTTOM OF BLADE)
11 INCHES
13 INCHES
1-1/2 INCHES
16 INCHES
16 INCHES
KEY
▨ REPAIR NOT APPLICABLE
■ WIRE MESH REPAIRS LARGER THAN 1 SQ INCH REQUIRE REPLACEMENT OF DAMAGED MESH.
▩ SKIN PATCH PERMITTED
445

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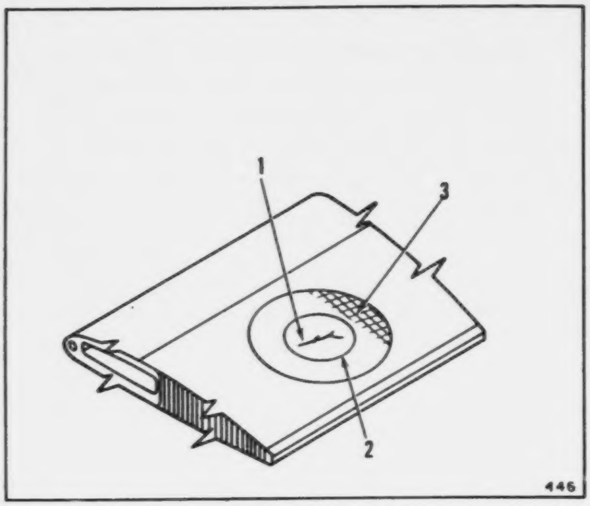
5-67.2 REPAIR BLADE FAIRING SKIN DAMAGE (Continued) 5-67.2

2. **Outline damage area (1).** Make circle or oblong outline (2).

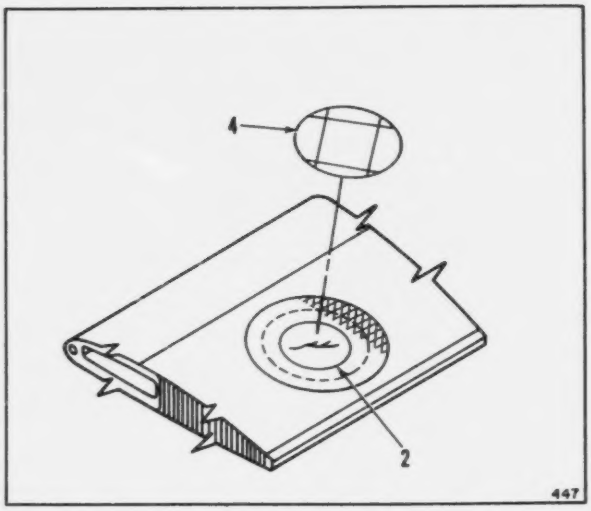
CAUTION

Do not wash contaminants into damage area if acetone (E20) is used to soften finish. Contaminants can prevent satisfactory repair.

3. **Remove finish 1 1/2-inches outside of outline (2)** around damage. Use sanding block and abrasive paper (E6). Use acetone (E20), if needed, to soften finish. Complete finish removal. Use abrasive paper (E7). Do not sand through wire mesh.
4. If wire mesh diverter (3) must be replaced, expose wire mesh 1 1/2-inches outside of outline (2).



5. **Prepare skin patch (4)** as follows:
   a. Position piece of fiberglass laminate (E168 or 168.1) over repair area with fibers at 45 degrees to chord.
   b. Draw outline on fiberglass laminate (E168 or 168.1) 1 inch larger than damaged area outline (2). Use pencil compass and straightedge.
   c. Cut skin patch (4). Smooth rough edges. Use abrasive paper (E7).



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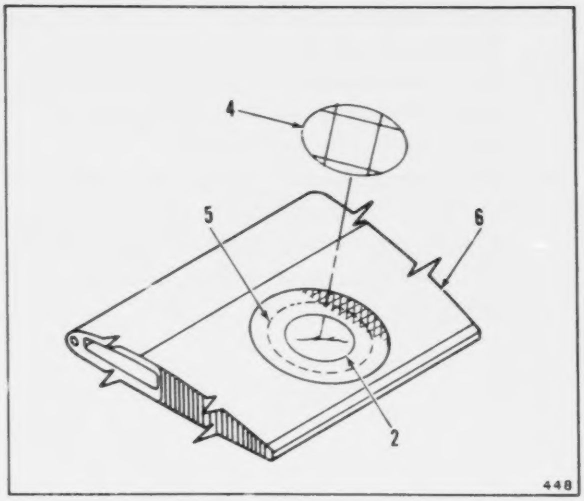
5-67.2 REPAIR BLADE FAIRING SKIN DAMAGE (Continued) 5-67.2



d. Check that patch (4) is 1-inch larger than damaged area outline (2) on all sides. Check that blade surface finish is removed 1/2-inch around patch.

e. Trace patch outline (5) onto blade skin (6).

f. Sand both sides of patch (4) to remove surface glaze. Remove peel ply if necessary. Use abrasive paper (E9).

NOTE

Patch will not adhere if surface glaze is not removed.

6. Wear gloves (E186). **Clean skin (6) where finish was removed.** Use cloth (E120) damp with acetone (E20). Wipe dry immediately. Use dry cloth (E120). Do not remove gloves.

INSPECT

APPLY ADHESIVE

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41) only if prepackaged kit is not available.

7. **Mix tube of adhesive (E40).** Follow instructions on kit.

8. If adhesive (E40) is not available, prepare adhesive (E41) as follows:

   a. Weigh 100 parts of resin and 23 parts of hardener. Use trip balance.

   b. Mix parts in polyethylene cup (E157) until color is uniform. Use tongue depressor (E424).

NOTE

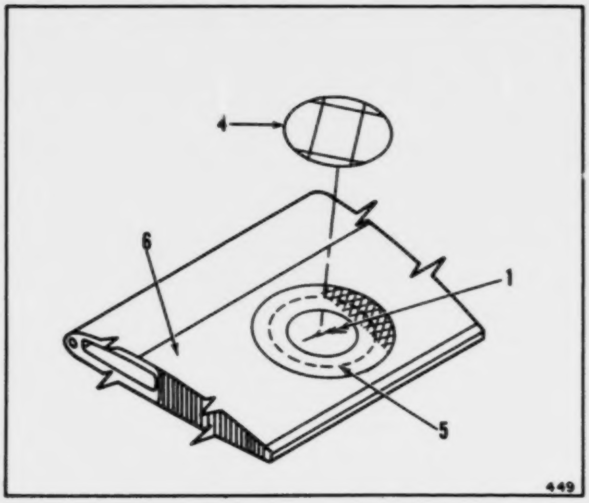
Working life of adhesive is 30 minutes.

GO TO NEXT PAGE

5-67.2 REPAIR BLADE FAIRING SKIN DAMAGE (Continued) 5-67.2

9. Apply adhesive (E40 or E41) to outlined area (5) of blade skin (6) and one side of patch (4). If fiberglass laminate (E168.1) is used, apply adhesive so edges of patch curl towards blade. Use stiff brush.

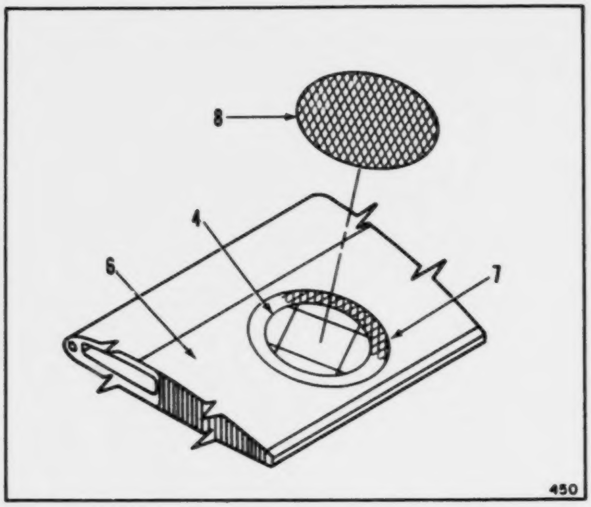
10. Center patch (4) over damage (1), within outline (5). Position patch with fibers at 45 degrees to blade chord. Press onto skin (6). If wire mesh diverter damage is less than 1 square-inch, go to step 12.



11. If wire mesh diverter damage is more than 1 square-inch, replace mesh (7) as follows:

    a. Cut piece of mesh (E453) (8) to cover patch (4) and exposed mesh (7).

    b. Position mesh (E453) (8) over patch (4) and mesh (7). Seat firmly. Brush a thin coat of adhesive over mesh.



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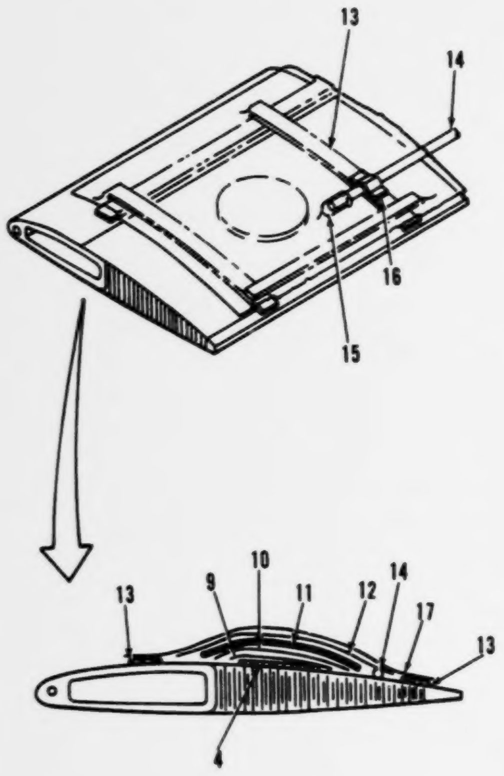
5-67.2 REPAIR BLADE FAIRING SKIN DAMAGE (Continued) 5-67.2

BOND FAIRING REPAIR

12. Cover repair with layer of peel ply (E270) (9) and layer of teflon-impregnated fabric (E170) (10). Make layers large enough to overlap patch (4) 1-inch.
13. Cover teflon-impregnated fabric (E170) (10). Use thick rubber pad (E318) (11).
14. Cover repair area. Use fiberglass cloth (E132) (12). Cut cloth large enough to cover rubber pad (E318) (11).
15. Surround cloth (E132) (12) with sealing tape (E396) (13). Keep tape clear of cloth.
16. Attach tube (14) to vacuum pump hose.
17. Wrap tube (14). Use two layers of fiberglass cloth (E132) (15). Apply masking tape (E388) over cloth.
18. Position tube (14) on cloth (E132) (12) covering repair. Wrap tube with sealing tape (E396) (16) where tube crosses sealing tape (13) already applied.
19. Press tube (14) onto tape (16) to make airtight seal.
20. Press polyvinyl sheet (E284) (17) smoothly onto tape (13) to make airtight seal.



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21. Start vacuum pump. Check for leaks. Reposition polyvinyl sheet (E284) (17) or add tape (E396) (13) as needed.
22. Maintain 20 inches Hg. vacuum during adhesive cure.

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.

23. Cure adhesive at 140° to 160°F (60° to 71°C) 2 hours . Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

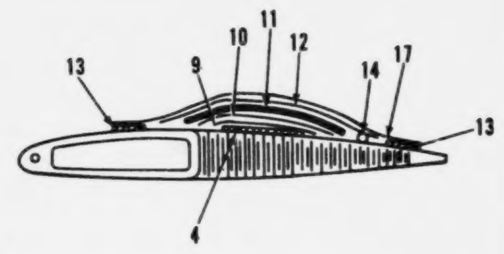
NOTE

Serviceable cure can be achieved without heat at 70° to 80°F (21° to 27°C) in 24 hours . Vacuum may be removed after 12 hours .

24. Turn off vacuum pump.
25. Remove peel ply (9), fabric (10), rubber (11), fiberglass (12), tape (13), tube (14), and sheet (17).
26. If squeezeout fairing is not satisfactory, fair patch. Use adhesive (E40 or E41). Follow steps 7 or 8 to mix adhesive.

INSPECT

27. Find weight of repair. Use Adhesive Weight for Single Skin Repairs table. Record weight for blade tracking weight adjustment.



452

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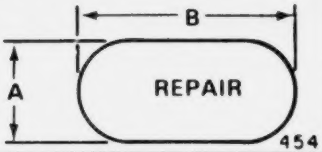
5-67.2 REPAIR BLADE FAIRING SKIN DAMAGE (Continued) 5-67.2

ADHESIVE WEIGHT FOR SINGLE SKIN REPAIRS

WIDTH (INCHES)	LENGTH (INCHES)												
B A	2	4	6	8	10	12	14	16	18	20	22	24	26
2	5 1 .03	8 2 .05	11 3 .06	15 3 .07	18 4 .09	21 5 .10	24 6 .12	28 6 .13	31 7 .15	34 8 .16	37 9 .17	41 9 .19	44 10 .20
3		10 2 .06	14 3 .07	18 4 .09	22 5 .10	26 6 .12	30 7 .12	34 8 .15	38 9 .17	42 10 .19	46 11 .20	50 12 .22	54 13 .23
4		11 3 .06	16 4 .08	21 5 .10	26 6 .12	31 7 .14	36 8 .16	41 9 .17	46 10 .19	50 12 .21	55 13 .23	60 14 .25	65 15 .26
5			18 4 .09	24 6 .11	30 7 .13	36 8 .15	41 10 .17	47 11 .20	53 12 .22	59 13 .24	64 15 .26	70 16 .28	76 17 .30
6			20 5 .10	27 6 .13	33 8 .15	40 9 .17	46 11 .19	53 12 .21	59 14 .24	66 15 .26	73 17 .28	79 18 .30	85 20 .33
7				29 7 .14	37 8 .16	44 10 .19	51 12 .21	59 13 .24	66 15 .26	73 17 .28	80 19 .31	88 20 .33	95 22 .36
8				32 7 .15	40 9 .17	48 11 .20	56 13 .22	64 15 .25	72 17 .28	80 19 .31	89 20 .33	97 22 .36	105 24 .39
9					43 10 .19	52 12 .21	61 14 .24	70 16 .27	79 18 .30	88 20 .33	97 22 .36	106 24 .39	115 26 .42
10					46 11 .20	56 13 .23	66 15 .29	76 16 .34	85 20 .32	95 22 .35	105 24 .39	115 26 .42	124 29 .45
11						59 14 .24	70 16 .28	80 19 .31	91 21 .34	102 23 .38	112 26 .41	123 28 .44	133 31 .48
12						63 14 .26	74 17 .29	85 20 .33	97 22 .36	108 25 .40	120 27 .43	131 30 .47	142 33 .51
13							78 18 .31	90 21 .34	102 24 .38	115 26 .42	127 29 .46	139 32 .50	151 35 .53
14							82 18 .31	95 22 .36	108 25 .40	121 28 .44	134 31 .48	147 34 .52	160 37 .56
15								99 23 .38	113 26 .42	127 29 .46	141 32 .50	154 36 .54	168 39 .59

EXAMPLE:

78 - WEIGHT OF BASE IN GRAMS
18 - WEIGHT OF HARDENER IN GRAMS
31 - TOTAL WEIGHT OF REPAIR IN POUNDS



FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).

Adjust blade balance weights (Task 5-82.1).

END OF TASK

5-67.3 REPAIR BLADE FAIRING SKIN DELAMINATION 5-67.3

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Scissors
Sanding Block
Vacuum Pump
Protective Clothing
Respirator
Trip Balance, NSN 6670-00-410-7195
Heat Lamp

Materials:

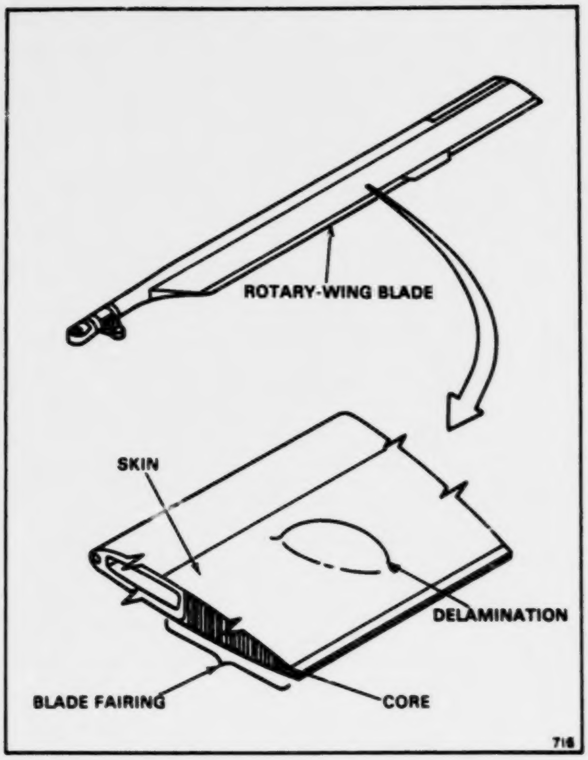
Acetone (E20)
Gloves (E186)
Abrasive Paper (E6), (E7), (E9)
Template Paper (E263)
Masking Tape (E388)
Teflon Tape (E399)
Aluminum (E70)
Cloth (E120)
Adhesive (E40, E41, E43 or E47.1)
Polyethylene Cup (E157)
Wood Spatula (E424)
Peel Ply (E270)
Teflon Impregnated Fabric (E170)
Rubber Pad (E318)
Glass Cloth (E132)
Sealing Tape (E396)
Polyvinyl Sheet (E284)
Temperature Indicating Strips (E413)
Curing Agent E158.1 (used with adhesive (E47.1))

Personnel Required:

Aircraft Structural Repairer
Inspector

Equipment Condition:

Off Helicopter Task



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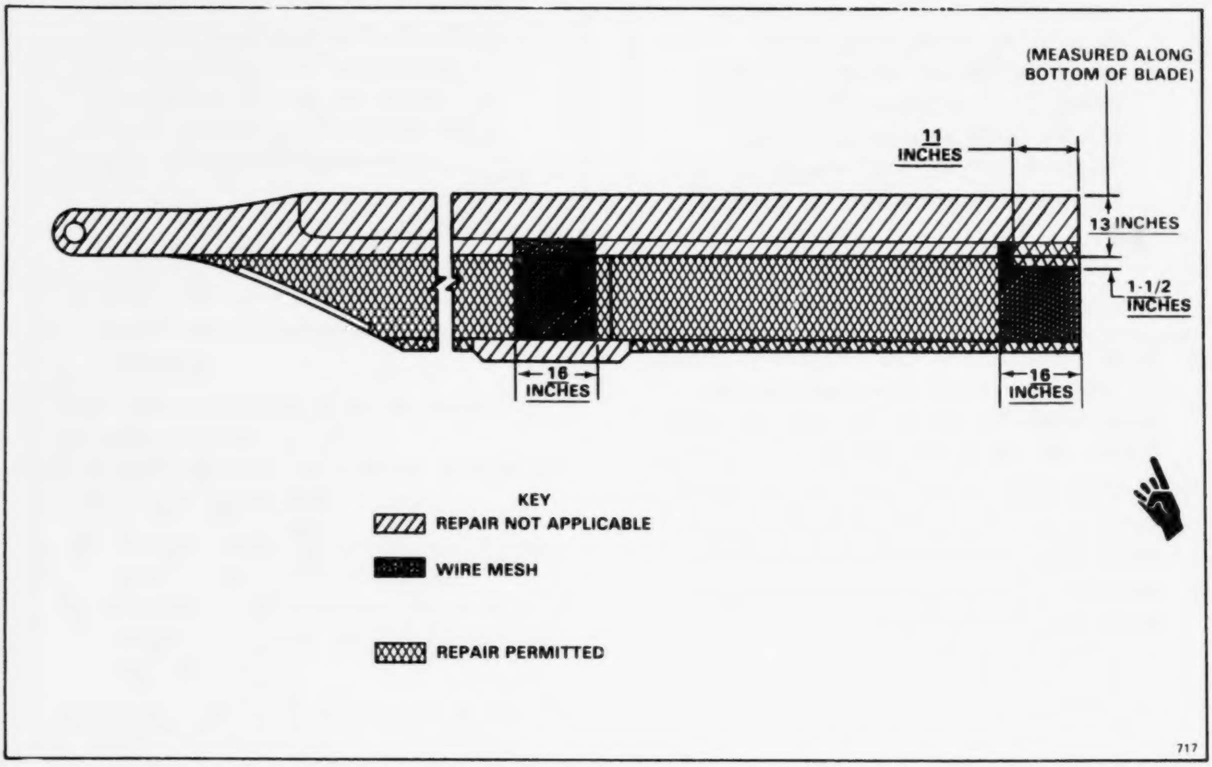
PREPARE DAMAGE AREA

1. **Check location and extent of delamination** of skin. **Refer to Fiberglass Skin Damage Repair Limits figure.** Skin must be repaired where repairs are allowed.


(MEASURED ALONG BOTTOM OF BLADE)
11 INCHES
13 INCHES
1-1/2 INCHES
16 INCHES
16 INCHES
KEY
▨ REPAIR NOT APPLICABLE
■ WIRE MESH
▩ REPAIR PERMITTED
717

GO TO NEXT PAGE

5-67.3 REPAIR BLADE FAIRING SKIN DELAMINATION (Continued) 5-67.3

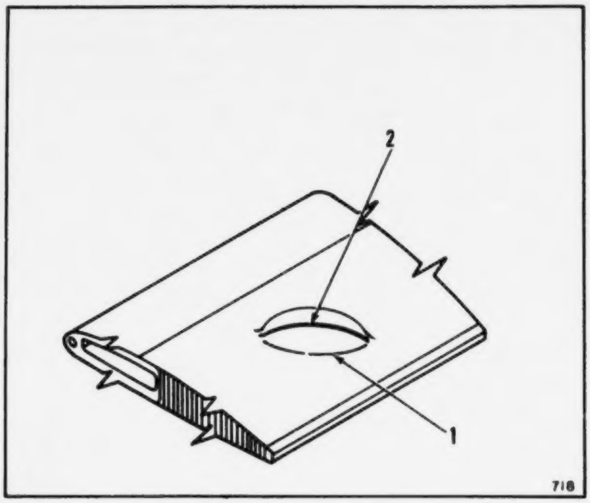
WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

Do not soak blade with acetone.

2. Wear gloves (E186). Clean delaminated area (1). Use cloth (E120) damp with acetone (E20). Wipe dry immediately. Use dry cloth (E120). Do not remove gloves.
3. Carefully make cut (2) through delaminated layers of skin (1) so that plies can be separated. Make cut parallel to outer ply fibers.
4. Separate plies enough to allow adhesive to be worked between them.



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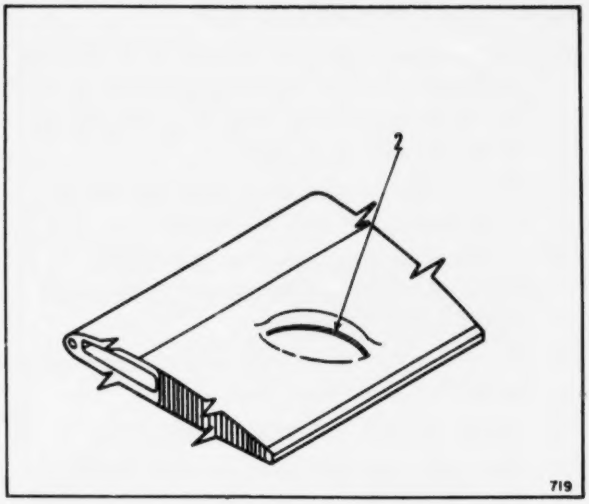
5-67.3 REPAIR BLADE FAIRING SKIN DELAMINATION (Continued) 5-67.3

APPLY ADHESIVE



WARNING

Adhesive (E40 or E41) is extremely flammable. It is volatile. It forms harmful vapors and explosive peroxides. Keep away from heat, sparks, or open flame. Avoid inhaling. Use only with adequate ventilation.

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesives (E41, E43 or E47.1) only if prepackaged kit is not available.

5. **Mix tube of adhesive (E40).** Follow instructions on kit.
6. If adhesive (E40) is not available, prepare adhesive (E41) as follows:
   a. Weigh 100 parts of resin and 23 parts of hardener. Use trip balance.
   b. Mix parts in polyethylene cup (E157) until color is uniform. Use tongue depressor (E424).
7. If adhesive (E43) is used, prepare as follows:
   a. Weigh 7 parts of gray hardener and 5 parts of white base. Use trip balance.
   b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424
8. If adhesive (E47.1) is used, prepare as follows:
   a. Weigh equal parts of adhseive (E47.1) and curing agent (E158.1). Use trip balance.
   b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

NOTE

Working life of adhesive is 30 minutes

9. Work adhesive (E40, E41, E43 or E47.1) into separated plies on each side of cut (2). Use a length of clean shim stock.

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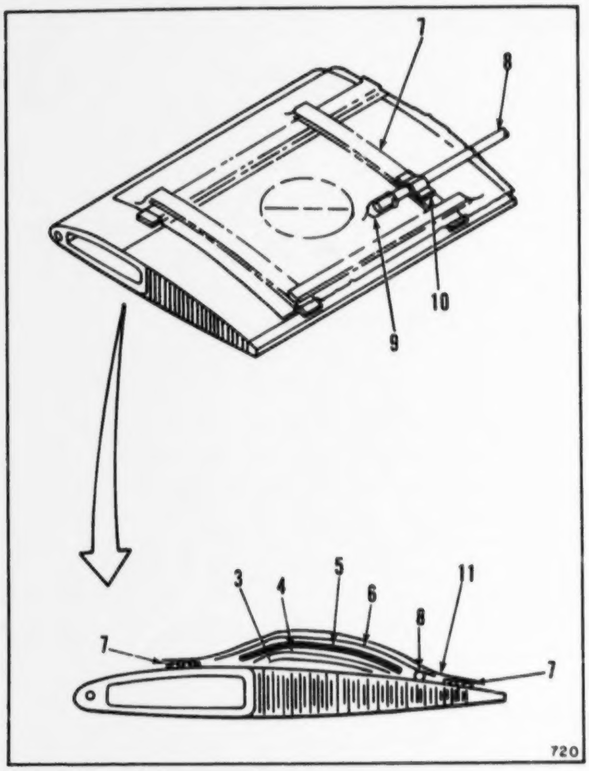
5-67.3 REPAIR BLADE FAIRING SKIN DELAMINATION (Continued) 5-67.3

BOND DELAMINATION REPAIR

10. Cover repair with layer of peel ply (E270) (3) and layer of teflon-impregnated fabric (E170) (4). Make layers large enough to overlap delaminated area (1) 1-inch .
11. Cover teflon-impregnated fabric (E170) (4). Use thick rubber pad (E318) (5).
12. Cover repair area. Use fiberglass cloth (E132) (6). Cut cloth large enough to cover rubber pad (E318) (5).
13. Surround cloth (E132) (6) with sealing tape (E396) (7). Keep tape clear of cloth.
14. Attach tube (8) to vacuum pump hose.
15. Wrap tube (8). Use two layers of fiberglass cloth (E132) (9). Apply masking tape (E388) over cloth.
16. Position tube (8) on cloth (E132) (6) covering repair. Wrap tube with sealing tape (E396) (10) where tube crosses sealing tape (7) already applied.
17. Press tube (8) onto tape (10) to make airtight seal.
18. Press polyvinyl sheet (E284) (11) smoothly onto tape (7) to make airtight seal.



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5-67.3 REPAIR BLADE FAIRING SKIN DELAMINATION (Continued) 5-67.3

19. Start vacuum pump. Check for leaks. Reposition polyvinyl sheet (E284) (11) or add tape (E396) (7) as needed.
20. Maintain 20 inches Hg. vacuum through adhesive cure.

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.

21. Cure adhesive at 150° to 160°F (66° to 71°C) 2 hours . Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70° to 80°F (21° to 27°C) in 24 hours . Vacuum may be removed after 12 hours .

22. Turn off vacuum pump.
23. Remove peel ply (3), fabric (4), rubber (5), fiberglass (6), tape (7), tube (8), and sheet (11).

WARNING

Harmful particles can be inhaled if respirator is not worn while sanding.

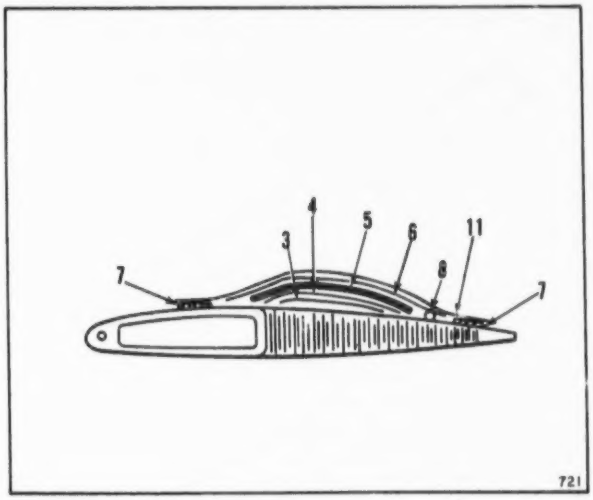
24. Sand adhesive squeeze out from cut (2) to blend with surrounding area. Use abrasive paper (E9). Wear a respirator.

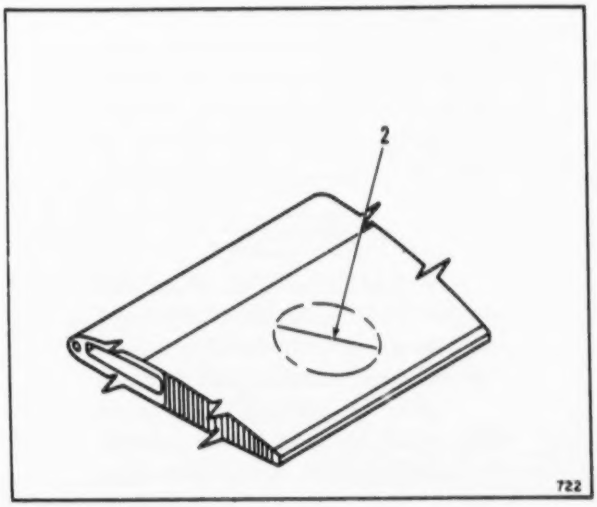
INSPECT

FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).

END OF TASK





5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH 5-68

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Scissors
Sanding Block
Pencil Compass
Router
Router Bit, 4-Fluted, A2154108
Vacuum Cleaner
Hole Saw
Vacuum Pump
Protective Clothing
Respirator
Trip Balance, NSN 6670-00-401-7195
Heat Lamp

Materials:

Wire Mesh (E453)
Acetone (E20)
Gloves (E186)
Abrasive Paper (E6, E7, E9)
Template Paper (E263)
Masking Tape (E388)
Teflon Tape (E399)
Aluminum (E70)
Cloth (E120)
Adhesive (E40, E41, or E43)
Core Material (E145 or E146)
Polyethylene Cup (E157)
Wood Spatula (E424)
Peel Ply (E270)
Teflon Impregnated Fabric (E170)
Rubber Pad (E318)
Glass Cloth (E132)
Sealing Tape (E396)
Polyvinyl Sheet (E284)
Temperature Indicating Strips (E413)
Fiberglass Laminate (E168 or E168.1)

Personnel Required:

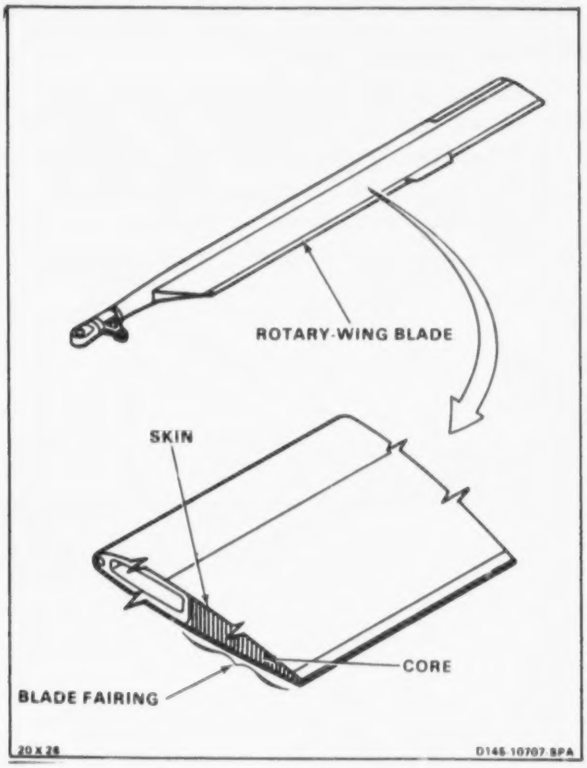
Aircraft Structural Repairer
Inspector

References:

Task 5-70

Equipment Condition:

Off Helicopter Task



General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Adhesive (E40 or E41) is extremely flammable. It is volatile. It forms harmful vapors and explosive peroxides. Keep away from heat, sparks, or open flame. Avoid inhaling. Use only with adequate ventilation.

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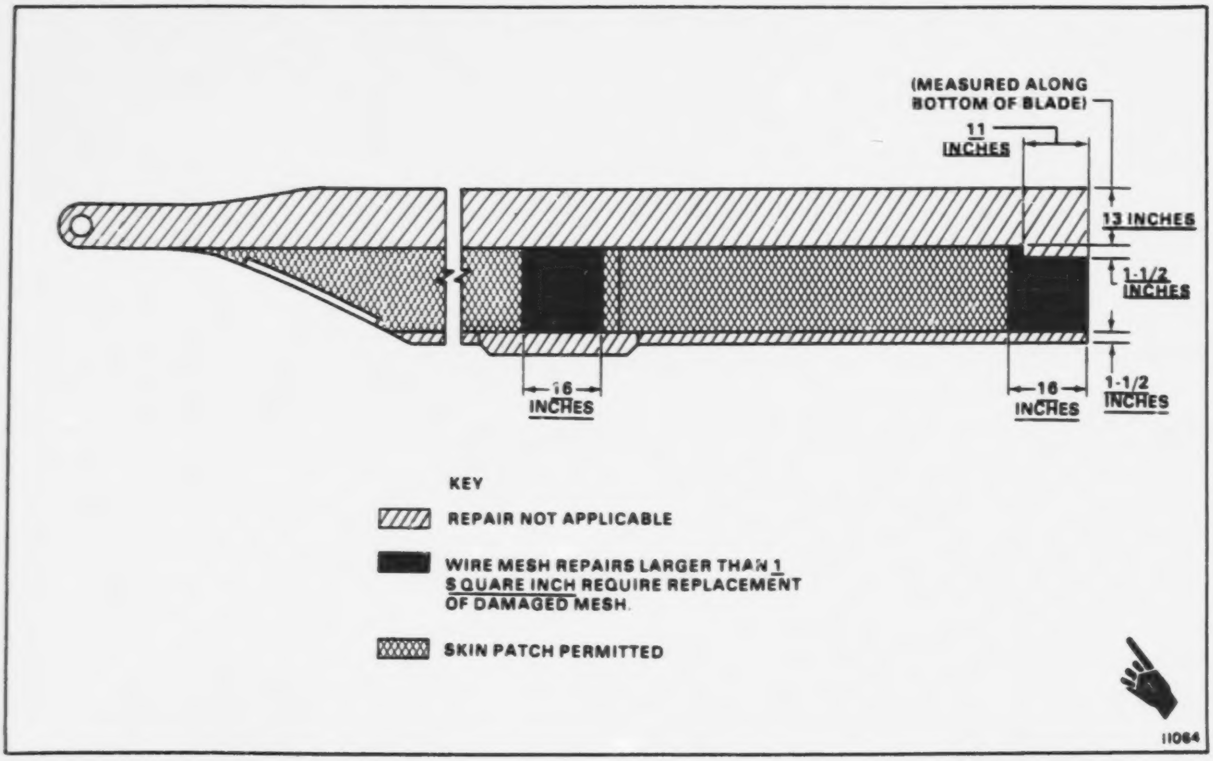
5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68

PREPARE DAMAGE AREA

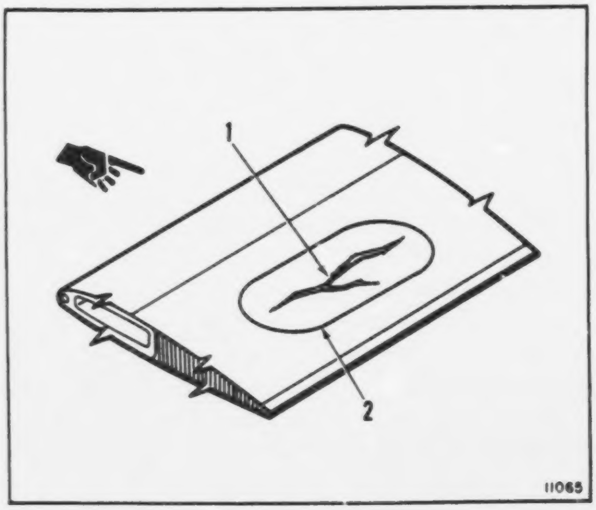
1. **Check location and extent of damage** to one skin and full depth of core. **Refer to Fiberglass Skin Damage Repair Limits figure.** Skin and core below skin must be replaced where repairs are allowed.


(MEASURED ALONG BOTTOM OF BLADE)
11 INCHES
13 INCHES
1-1/2 INCHES
16 INCHES
16 INCHES
1-1/2 INCHES
KEY
▨ REPAIR NOT APPLICABLE
■ WIRE MESH REPAIRS LARGER THAN 1 SQUARE INCH REQUIRE REPLACEMENT OF DAMAGED MESH.
▩ SKIN PATCH PERMITTED
11064

2. **Outline damage area (1).** Make circle or oblong outline (2). Damage removal area shall have no corners.

CAUTION

Do not wash contaminants into damage area if acetone (E20) is used to soften finish. Contaminants can prevent satisfactory repair.



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5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68

3. **Remove finish** around damage area for a distance of at least 1.5 inches. Use sanding block and abrasive paper (E6). Use acetone (E20), if needed to soften finish. Complete finish removal with abrasive paper (E7). Do not sand through wire mesh (3).
4. If wire mesh diverter (3) must be replaced, expose wire mesh 1.5 inches outside of damage area.
5. Draw outline (4) around area to be removed. Use pencil compass and straightedge. If damage area (1) will not support compass point, cover area. Use template paper (E263) and masking tape (E388).
6. **If router (5) is used to remove damaged skin, proceed as follows:**

NOTE

If router is not available, go to step 7 or 8 for alternate methods.

a. **Draw line (6) around outline (4).** Space outer line (6) so router base (7) will follow it while router bit (8) follows outline (4). Use pencil compass and straightedge. If damage area (1) will not support compass point, cover area. Use template paper (E263) and masking tape (E388). Remove paper and tape.

NOTE

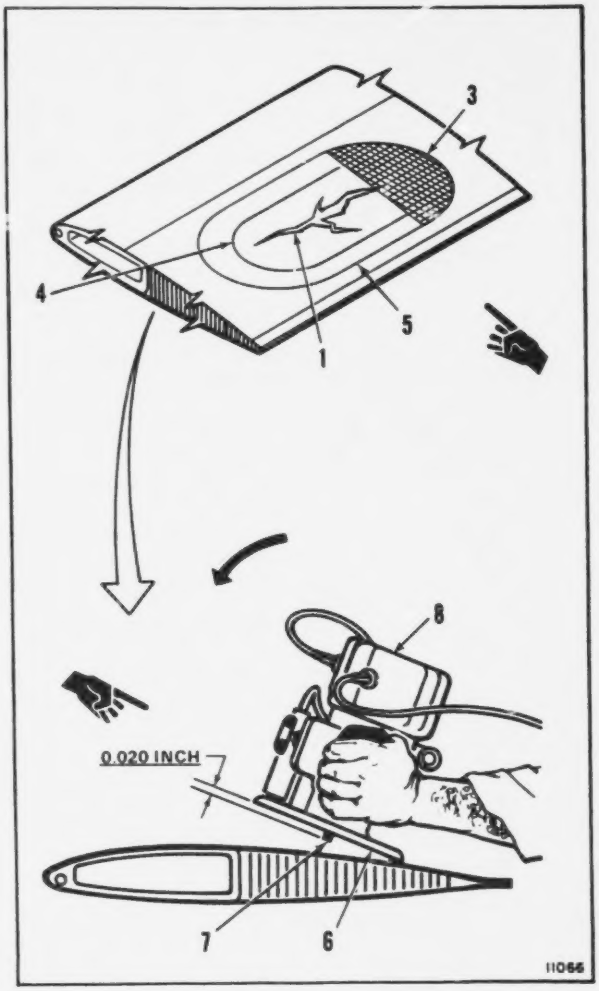
If router base diameter is 6 inches, outer line (6) should be 2.75 inches outside outline (4) when 0.5 inch router bit is used.

b. Install router bit (8). Set depth to about 0.020 inch.

WARNING

Wear goggles, respirator, and protective clothing when using router. Fiberglass particles will irritate eyes, lungs, and skin.

c. Start router (5). Keep router under control. Use both hands.



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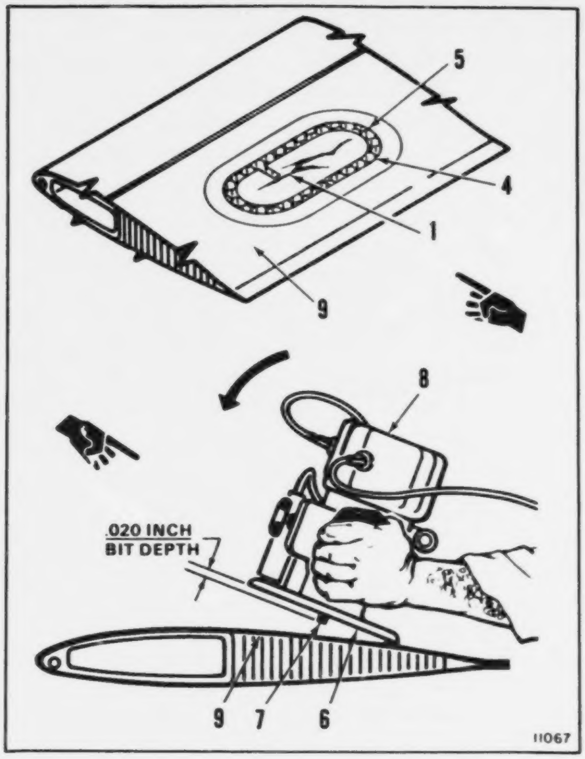
5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68

d. Rest edge of router base (7) on router guide line (6). Keep bit (8) above blade skin (9).

e. Slowly lower bit (8) onto blade skin (9). Keep edge of router base (6) on guide line (6). Move router (5) counterclockwise.

f. Complete cut and move router (5) to center of damage area (1). Turn router off and remove it.



7. **If hole saw is used to remove damaged skin, proceed as follows:**

   a. Use hole saw with center drill that does not extend more than 0.25 inch beyond saw.

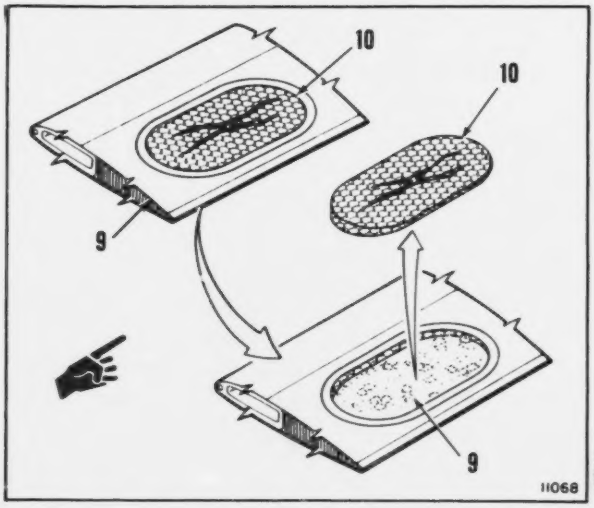
   b. Position hole saw on guide line (4). Cut only deep enough to go through skin (9). Hold saw lightly against skin and turn slowly. Use wrench.

8. **If knife is used to remove damaged skin, make a series of punctures along guide line until damaged skin is separated.**

9. **Peel off cut-out section of skin (9).** Use pliers and chisel. Peel from center outward. Do not pry against undamaged skin.

CAUTION

Do not cut or score opposite skin when removing damaged core. If opposite skin is damaged, a double skin repair must be done (Task 5-70).



10. **Cut through core (10) to opposite skin (9).** Use pen knife with blunt point. Cut only deep enough to separate damaged core. If opposite skin is damaged, make a double skin repair (Task 5-70).

11. **Remove damaged core (10).** Use pliers and chisel. Avoid damage to skin.

12. **Sand bottom skin (9)** where core (10) was removed. Use abrasive paper (E7).

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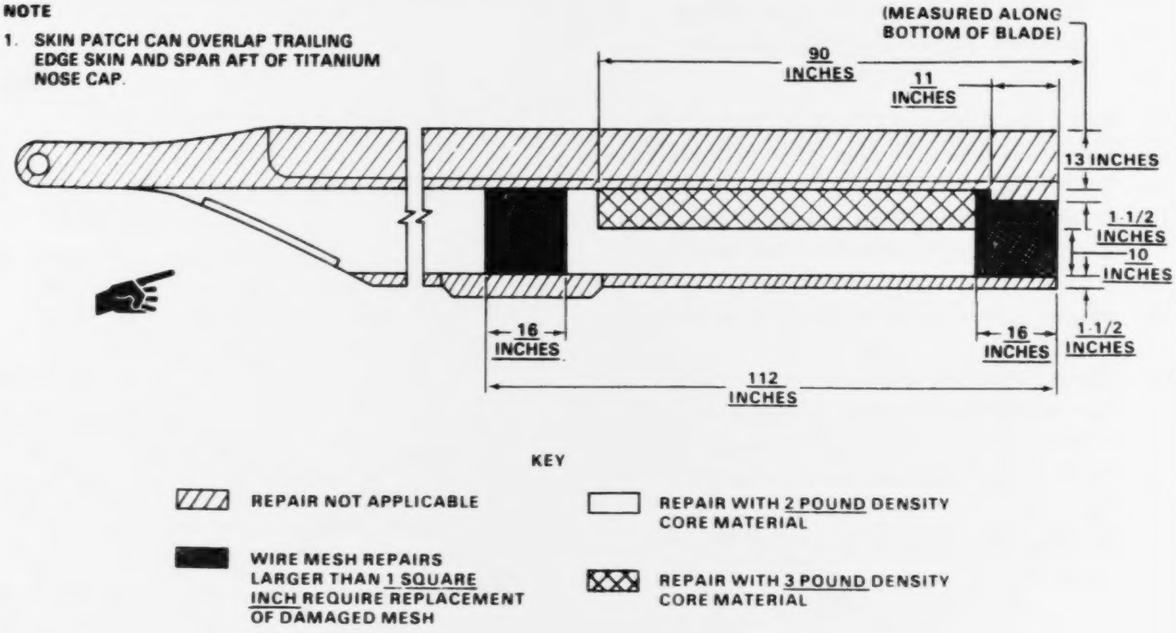
5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68

PREPARE REPAIR MATERIALS

13. Use core material (E145) in 3-pound density repair area. Use core material (E146) in 2-pound density repair area. Refer to **Fiberglass Blade Skin and Core Damage Repair Limits figure.**

NOTE

1. SKIN PATCH CAN OVERLAP TRAILING EDGE SKIN AND SPAR AFT OF TITANIUM NOSE CAP.


(MEASURED ALONG BOTTOM OF BLADE)
90 INCHES
11 INCHES
13 INCHES
1-1/2 INCHES
10 INCHES
1-1/2 INCHES
16 INCHES
16 INCHES
112 INCHES
KEY
▨ REPAIR NOT APPLICABLE
■ WIRE MESH REPAIRS LARGER THAN 1 SQUARE INCH REQUIRE REPLACEMENT OF DAMAGED MESH
☐ REPAIR WITH 2 POUND DENSITY CORE MATERIAL
⊠ REPAIR WITH 3 POUND DENSITY CORE MATERIAL

11069

GO TO NEXT PAGE

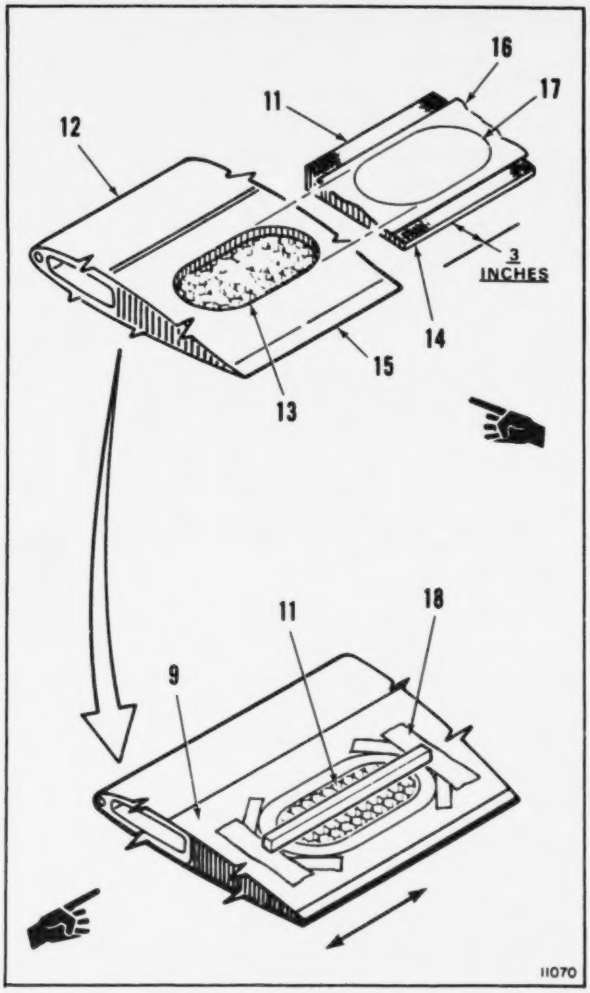
5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68

14. **Position core material (E145 or E146) (11) on blade (12)** next to cutout (13). Locate trailing edge (14) of core material 3 inches forward of blade trailing edge (15).
15. **Apply masking tape (E388) (16)** to cover area on core material (E145 or E146) (11) slightly larger than cutout area.
16. **Draw outline (17) on tape (E388) (16)** in shape of cutout (13) and 1/8 inch larger.

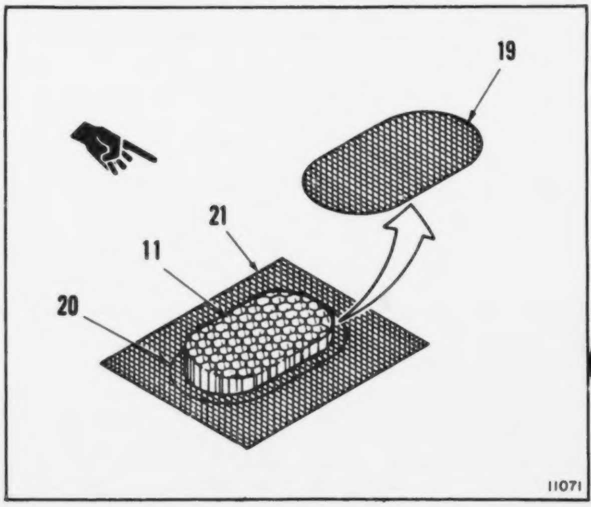
NOTE

Repair plug must have same contour as blade and be slightly larger than cutout.

17. **Cut core material (E145 or E146) (11)** on tape outline (17). Use knife. Remove tape (E388) (16).
18. **Position core (11) in cutout (13).** Check that core projects above skin (9) at all points.
19. **Apply teflon tape (E399) (18)** around cutout (13).
20. **Sand core (11)** flush with tape (E399) (18). Use sanding block about 2 inches wide and long enough to span length of repair, and abrasive paper (E6). Use spanwise strokes. Remove tape.
21. **Matchmark core (11)** and skin (9). Remove core.



22. **Prepare skin patch (19)** as follows:
    a. Position core (11) on piece of fiberglass laminate (E168 or E168.1) (21) with fibers at 45 degrees to chord.
    b. Draw outline (20) of core (11) on fiberglass laminate (E168 or E168.1) (21). Draw outline 1 inch larger than core. Use pencil compass and straightedge.
    c. Cut skin patch (19). Smooth rough edges. Use abrasive paper (E7).



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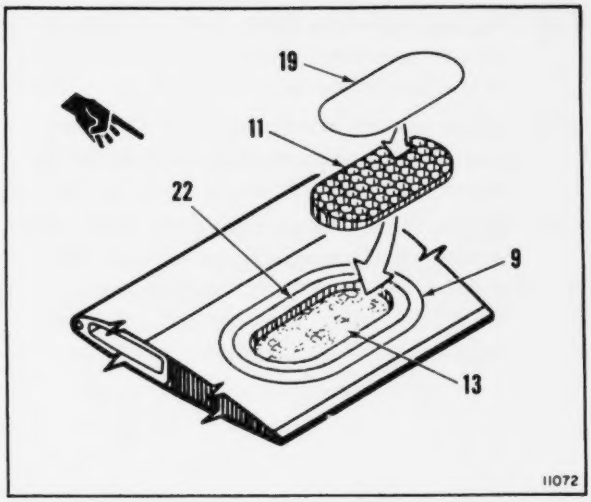
5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68



d. Check that patch (19) is 1 inch larger than core (11) on all sides. Check that blade surface finish is removed 1/2 inch around patch.

e. Trace patch outline (22) onto blade skin (9).

f. If fiberglass laminate (E168.1) is used, remove peel ply from surfaces of patch. Clean patch with acetone (E20) and wipe dry.

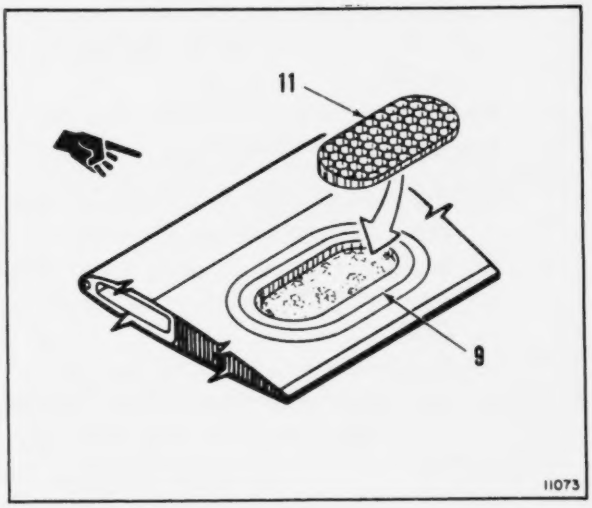
g. Sand both sides of patch (22) to remove surface glaze. Use abrasive paper (E9).

NOTE

Patch will not adhere if surface glaze is not removed.

23. **Clean core (11) and cutout (13).** Use vacuum cleaner.

24. Wear gloves (E186). **Clean core (11) and skin (8) where finish was removed.** Use cloth (E120) damp with acetone (E20). Wipe dry with clean cloth. Do not remove gloves.



INSPECT

APPLY ADHESIVE

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41 or E43) only if prepackaged kit is not available.

25. **Mix tube of adhesive (E40).** Follow instructions on kit.

26. If adhesive (E40) is not available, prepare adhesive (E41) as follows:

    a. Weigh 100 parts of resin and 23 parts of hardener. Use trip balance.

    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

27. If adhesive (E43) is used, prepare as follows:

    a. Weigh 7 parts of gray hardener and 5 parts of white base. Use trip balance.

    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

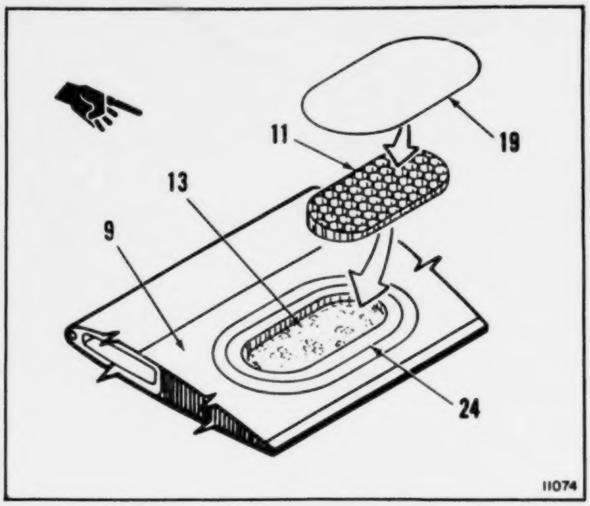
NOTE

Working life of adhesive is 30 minutes.

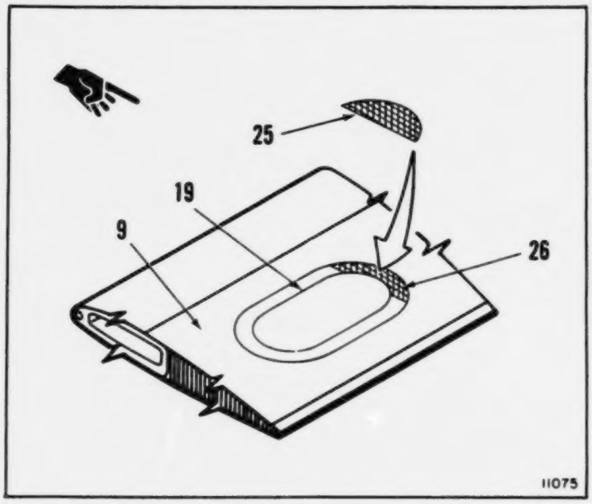
GO TO NEXT PAGE

5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68

28. **Apply adhesive (E40, E41, or E43)** to bottom and sides of cutout (13) and core (11). Use stiff brush.
29. **Align match marks on core (11) and cutout (13). Insert core** until seated on bottom. Check that core is flush with skin.
30. **Apply adhesive to core (11), area (24) where finish was removed, and one side of patch (22).** If fiberglass laminate (E168.1) is used, apply adhesive so outer edges of patch curl towards the blade.



31. Center patch over insert, within outline. Position patch with fibers at 45 degrees to blade chord. Press onto skin (9). If wire mesh diverter damage is less than 1 square-inch, go to step 33.
32. If wire mesh diverter damage is more than 1 square-inch, replace mesh (25) as follows:
    a. Cut piece of mesh (E453) (25) to cover patch (22) and exposed mesh (26).
    b. Brush thin coat of adhesive (E40 or E41) over patch (22) and damaged mesh (26).
    c. Position mesh (E453) (25) over patch (22). Seat firmly. Brush excess adhesive over mesh. Fair adhesive to blade skin (8).



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5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68

BOND FAIRING REPAIR

33. **Bond fairing repair with larger dimension less than 5 inches as follows.** If dimension is greater than 5 inches, go to step 34.

   a. Cover repair with layer of peel ply (E270) (27) and layer of teflon-impregnated fabric (E170) (28). Make layers large enough to overlap patch (22) 1 inch.

   b. Cover teflon-impregnated fabric (E170) (28). Use thick rubber pad (E318) (29).

   c. Cover repair area. Use fiberglass cloth (E132) (30). Cut cloth large enough to cover rubber pad (E318) (29).

   d. Surround cloth (E132) (30) with sealing tape (E396) (31). Keep tape clear of cloth.

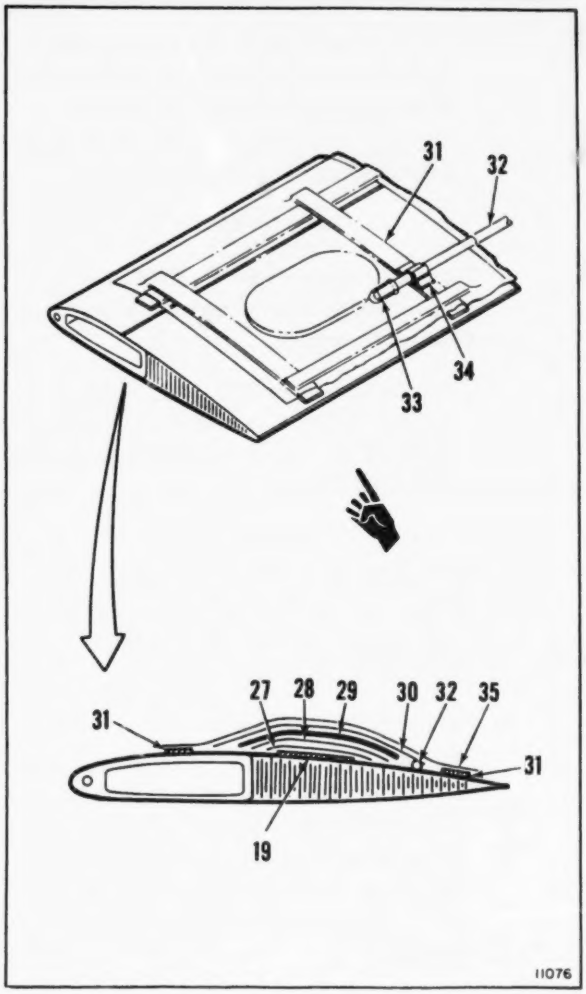
   e. Attach tube (32) to vacuum pump hose.

   f. Wrap tube (32). Use two layers of fiberglass cloth (E132) (33). Apply masking tape (E388) over cloth.

   g. Position tube (32) on cloth (E132) (30) covering repair. Wrap tube with sealing tape (E396) (34) where tube crosses sealing tape (31) already applied.

   h. Press tube (32) onto tape (34) to make airtight seal.

   i. Press polyvinyl sheet (E284) (35) smoothly onto tape (31) to make airtight seal.



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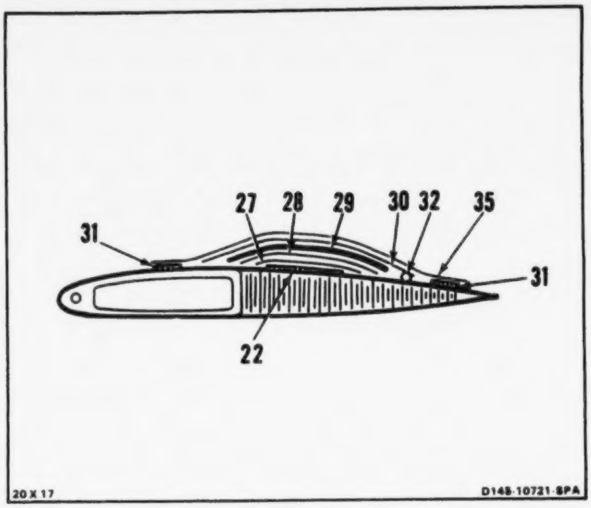
5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68

j. Start vacuum pump. Check for leaks. Reposition polyvinyl sheet (E284) (35) or add tape (E396) (31) as needed.

k. Maintain 20 inches Hg vacuum through adhesive cure.



CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.

l. Cure adhesive at 150 - 160°F (66 - 71°C) 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70 - 80°F (21 - 27°C) in 24 hours. Vacuum may be removed after 12 hours.

m. Turn off vacuum pump.

n. Remove peel ply (27, fabric (28), rubber (29), fiberglass (30), tape (31), tube (32), and sheet (35).

o. If squeezeout fairing is not satisfactory, fair patch. Use adhesive (E40, E41, or E43). Follow steps 25, 26 or 27 to mix adhesive.

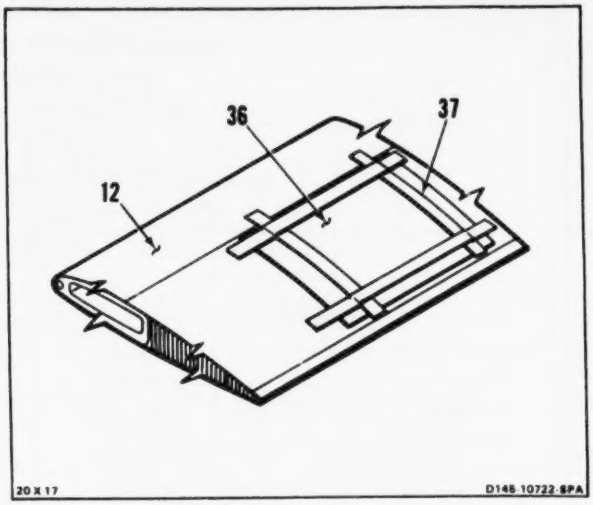
INSPECT

p. Go to step 35.

GO TO NEXT PAGE

5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68

34. **Bond fairing repair with larger dimension more than 5 inches as follows:**
    a. Cut piece of aluminum (E70) (36) large enough to overlap repair 2 inches in all directions.
    b. Position aluminum sheet (E70) (36) directly under repair. Tape aluminum sheet to bottom of blade (12). Use masking tape (E388) (37).
    c. Bond repair to blade as directed in step 33.
    d. Remove aluminum sheet (36).



INSPECT

35. Find weight of repair. Use Adhesive Weight for Single Skin and Core Repairs table. Record weight for blade tracking weight adjustment.

NOTE

If repair is larger than shown in table, use column and row for 1/2 repair size and double the weight shown.

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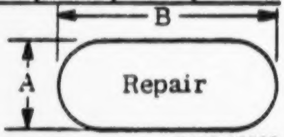
5-68 REPAIR BLADE FAIRING — SINGLE SKIN FULL DEPTH (Continued) 5-68

Adhesive Weight for Single Skin and Core Repairs

Length (inches)

Width (inches) A \ B	2	4	6	8	10	12	14	16	18	20	22	24	26
2	12 3 .05	16 4 .07	21 5 .09	26 6 .11	30 7 .12	35 8 .14	40 9 .16	44 10 .18	49 11 .19	54 12 .21	58 13 .23	63 14 .24	67 16 .26
3		20 5 .08	26 6 .11	32 7 .13	37 9 .15	43 10 .17	49 11 .19	54 13 .21	60 14 .23	66 15 .25	72 17 .27	78 18 .29	84 19 .31
4		24 5 .10	30 7 .12	37 9 .15	44 10 .17	51 12 .19	58 13 .22	65 15 .24	72 16 .26	79 18 .29	85 20 .31	93 21 .33	99 23 .36
5			34 8 .14	42 10 .16	50 12 .19	59 13 .22	67 15 .24	75 17 .27	83 19 .30	91 21 .32	99 23 .35	107 25 .38	115 27 .41
6			38 9 .15	47 11 .18	57 13 .21	66 15 .24	76 17 .27	85 19 .30	93 22 .33	103 24 .36	112 26 .39	121 28 .42	131 30 .45
7				52 12 .20	63 14 .23	73 17 .26	84 19 .30	93 22 .33	104 24 .36	115 26 .40	125 29 .43	136 31 .46	146 33 .50
8				57 13 .21	68 16 .25	80 18 .29	92 21 .32	102 25 .36	115 26 .39	126 29 .43	137 32 .47	150 34 .50	161 37 .54
9					74 17 .27	87 20 .31	99 23 .35	112 26 .39	124 29 .43	137 32 .46	150 35 .48	163 37 .54	176 40 .58
10					79 18 .29	93 21 .33	107 24 .37	120 28 .41	135 31 .46	149 34 .50	163 37 .54	176 41 .58	190 44 .63
11						99 23 .35	114 26 .39	129 30 .44	144 33 .49	159 37 .53	174 40 .58	189 44 .62	204 47 .67
12						105 24 .37	121 28 .42	137 32 .47	154 35 .52	170 39 .56	186 43 .61	202 46 .66	218 50 .71
13							128 29 .44	146 33 .49	163 38 .54	180 41 .60	198 45 .65	215 49 .70	232 53 .75
14							135 31 .46	153 35 .52	172 39 .57	190 44 .63	215 49 .70	227 52 .74	246 56 .79
15								160 37 .54	180 42 .60	200 46 .66	220 50 .72	239 55 .77	259 59 .83

Example:
135 - Weight of Base in Grams
31 - Weight of Hardener in Grams
.46 - Total Weight of Repair in Pounds



42 X 51

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END OF TASK

FOLLOW-ON MAINTENANCE:
Refinish repaired area (Task 5-82).
Adjust balance weights (Task 5-82.1).

5-69 REPAIR BLADE FAIRING — PARTIAL DEPTH 5-69

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit,
NSN 5180-00-323-4876
Wood Block, 1 X 1 X 48 Inches
Scissors
Sanding Block
Pencil Compass
Straightedge
Router
Router Bit, 4-Fluted, A2154108
Vacuum Cleaner
Hole Saw
Vacuum Pump
Protective Clothing
Respirator
Trip Balance, NSN 6670-00-401-7195
Heat Lamp
Wood Support Platform

Materials:

Wire Mesh (E453)
Acetone (E20)
Gloves (E186)
Abrasive Paper (E6, E7, E9)
Template Paper (E263)
Masking Tape (E388)
Teflon Tape (E399)
Cloth (E120)
Adhesive (E40, E41, E43, or E47.1)
Polyethylene Cup (E157)
Wood Spatula (E424)
Peel Ply ((E270)
Teflon-Impregnated Fabric (E170)
Rubber Pad (E318)
Glass Cloth (E132)
Sealing Tape (E396)
Polyvinyl Sheet (E284)
Temperature Indicating Strips (E413)
Fiberglass Laminate (E168 or E168.1)
Scrim Cloth (E325)
Core Material (E145 or E146)
Curing Agent (E158.1)

Personnel Required:

Aircraft Structural Repairer
Inspector

References:

Task 5-68
Task 5-70

Equipment Condition:

Off Helicopter Task

General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Adhesives (E40, E41, E43 or E47.1) are toxic. They can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

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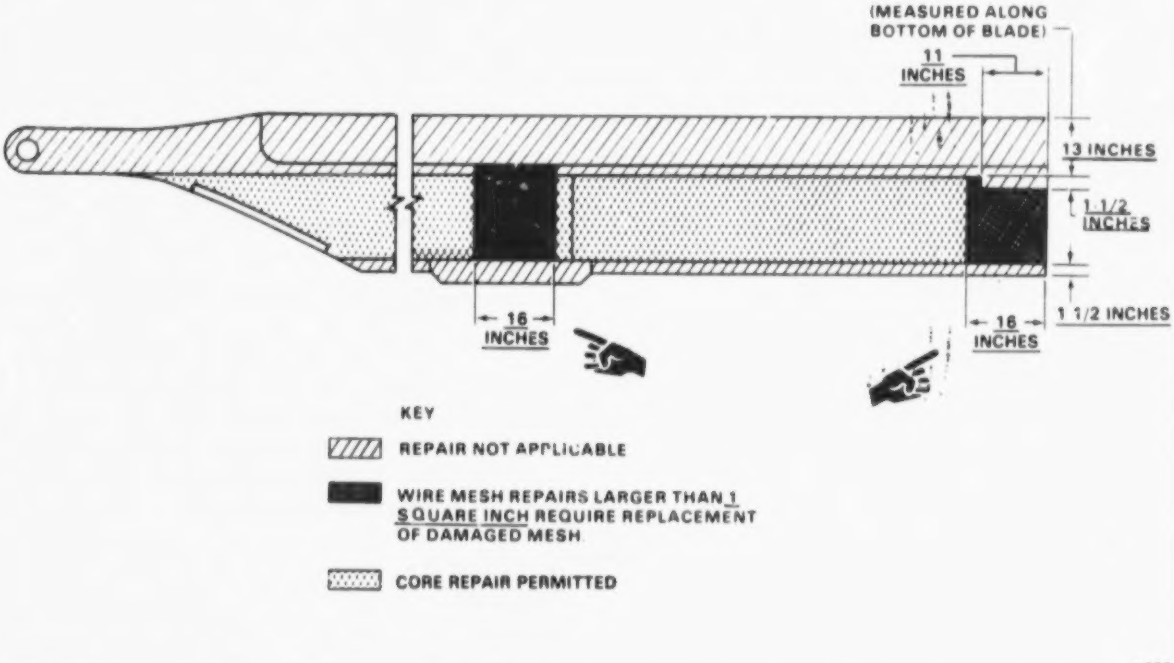
PREPARE DAMAGE AREA

1. **Check location and extent of damage** to one skin and up to half-depth of core. **Refer to Fiberglass Skin Damage Repair Limits figure.** If damage extends more than half-depth of core, or if router is not available, make a full depth repair (Task 5-68). Skin and partial core must be replaced where repairs are allowed.


(MEASURED ALONG
BOTTOM OF BLADE)
11 INCHES
13 INCHES
1 1/2 INCHES
1 1/2 INCHES
16 INCHES
16 INCHES
KEY
▨ REPAIR NOT APPLICABLE
■ WIRE MESH REPAIRS LARGER THAN 1 SQUARE INCH REQUIRE REPLACEMENT OF DAMAGED MESH
░ CORE REPAIR PERMITTED
11077

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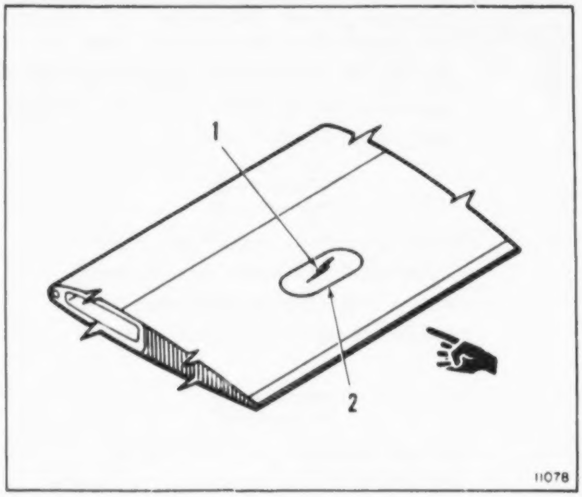
2. **Outline damage area (1).** Mark circle or oblong outline (2). Damaged removal area shall have no corners.

CAUTION

Do not wash contaminants into damaged area if acetone (E20) is used to soften finish. Contaminants can prevent satisfactory repair.



3. **Remove finish 1 1/2-inches outside of outline (2)** around damage. Use sanding block and abrasive paper (E6). Use acetone (E20) if needed to soften finish. Complete finish removal. Use abrasive paper (E7). Do not sand through wire mesh. Use gloves (E186).
4. If wire mesh diverter (3) must be replaced, expose wire mesh 1 1/2-inches outside of damage area (1).
5. **Draw line (4) around outline (2)** spaced at distance equal to radius of router base (5) away from outline. Use pencil compass and straightedge. If damaged area (1) will not support compass point, cover area. Use template paper (E263) and masking tape (E388).
6. **Use router (6) to remove damaged skin, proceed as follows:**
   a. Position blade (7) on table. Clamp 1 inch square wood strip (8) under trailing edge (9).

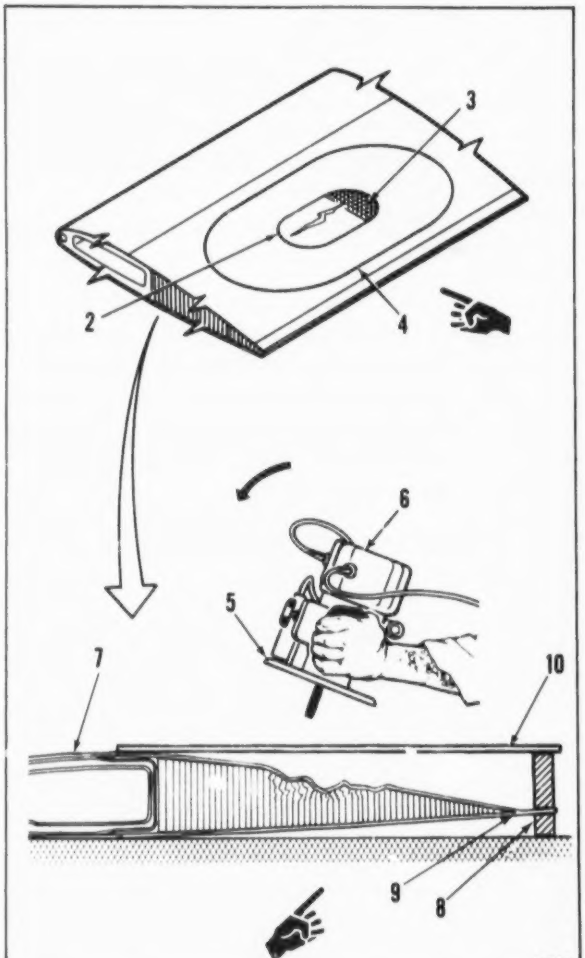
NOTE

Support at trailing edge puts honeycomb core cells 90 degrees to table surface.

   b. Make a support platform (10) on blade (7) to support router base (5) parallel to table surface.

CAUTION

Router bit must not extend more than 3/4 inch. It must not cut deep enough to damage opposite skin. If opposite skin is damaged, a double skin repair must be done (Task 5-70).



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5-69 REPAIR BLADE FAIRING — PARTIAL DEPTH (Continued) 5-69

c. Set router bit (11) to extend only enough to remove damaged core (12). If opposite skin is damaged, make double skin repair (Task 5-70).

WARNING

Wear goggles, respirator, and protective clothing when using router. Fiberglass particles will irritate eyes, lungs, and skin.

WARNING

Do not cut into spar. Spar damage shall cause rejection of rotor blade.

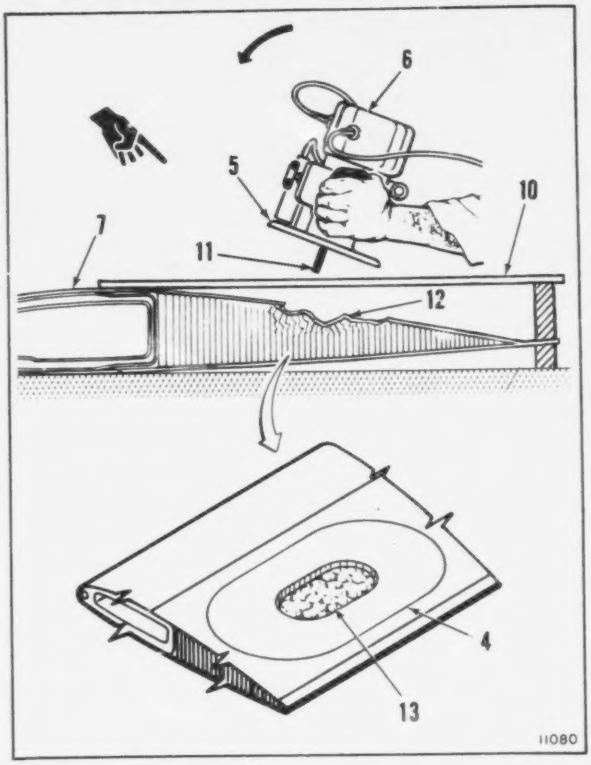
d. Start router (6). Grasp handles with both hands. Use wood platform (10) for support. Move router around using outer line (4) as guide for router base (5). Cut outline around damaged area.

e. Complete removal of damaged skin and core (12).

f. Turn router (6) off and remove it.

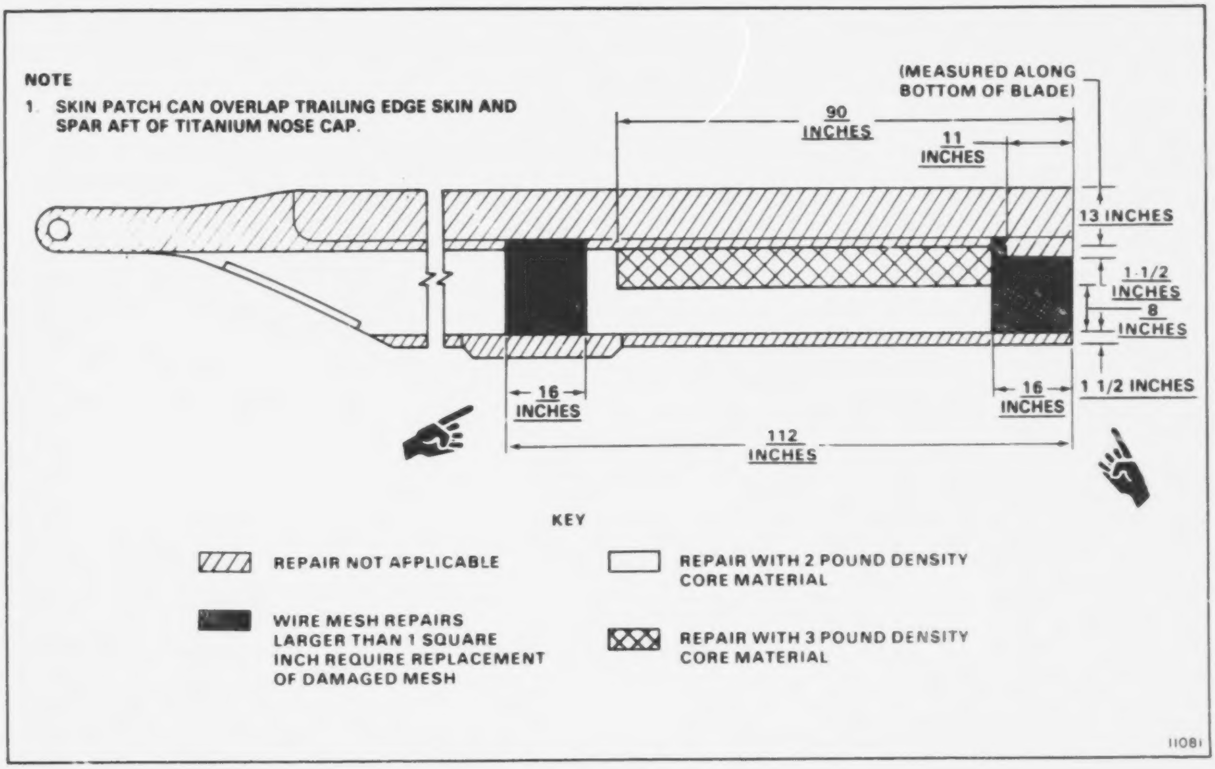
g. Check that all damaged core (12) has been removed. If necessary, increase depth of cut and repeat steps c. thru f. If depth of damage exceeds 3/4 inch or half the core depth, make a full depth repair (Task 5-68).

7. Clean cutout (13). Use vacuum cleaner.



PREPARE REPAIR MATERIALS

8. Use core material (E145) in 3-pound density repair area. Use core material (E146) in 2-pound density repair area. **Refer to Fiberglass Blade Skin and Core Damage Repair Limits figure.**


NOTE

1. SKIN PATCH CAN OVERLAP TRAILING EDGE SKIN AND SPAR AFT OF TITANIUM NOSE CAP.

(MEASURED ALONG BOTTOM OF BLADE)
90 INCHES
11 INCHES
13 INCHES
1-1/2 INCHES
8 INCHES
1 1/2 INCHES
16 INCHES
16 INCHES
112 INCHES
11081

KEY

▨ REPAIR NOT APPLICABLE

■ WIRE MESH REPAIRS LARGER THAN 1 SQUARE INCH REQUIRE REPLACEMENT OF DAMAGED MESH

☐ REPAIR WITH 2 POUND DENSITY CORE MATERIAL

▩ REPAIR WITH 3 POUND DENSITY CORE MATERIAL

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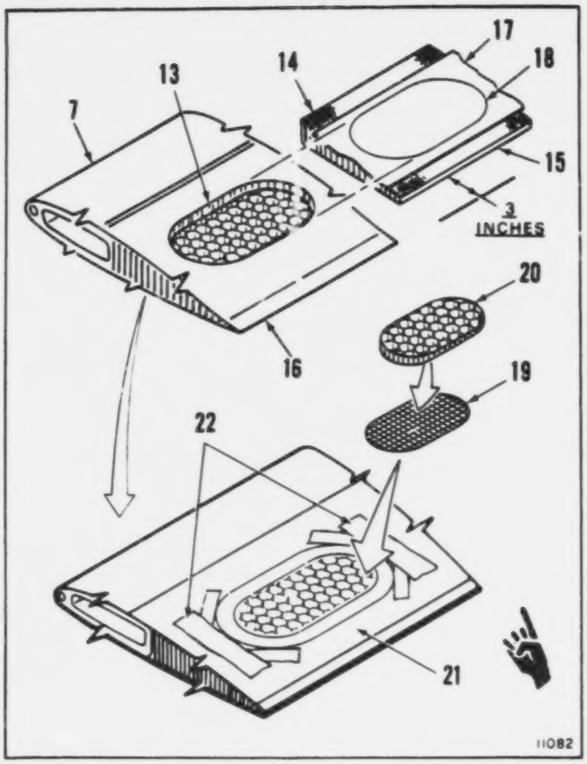
5-69 REPAIR BLADE FAIRING — PARTIAL DEPTH (Continued) 5-69

9. Position core material (E145 or E146) (14) on blade (7) next to cutout (13). Locate trailing edge (15) of core material 3-inches forward of blade trailing edge (16).
10. Apply masking tape (E388) (17) to cover area on core material (E145 or E146) (14) slightly larger than cutout (13).
11. Draw outline (18) on tape (E388) (17) in shape of cutout (13) and 1/8 inch larger.

NOTE

Repair plug must have same contour as blade and be slightly larger than cutout.

12. **Cut core material (E145 or E146) (14)** on tape outline (18). Use knife. Remove tape (E388) (17).
13. Position piece of scrim cloth (E325) (19) over cutout (13). Draw outline on scrim cloth.
14. Cut scrim cloth (19). Use scissors.
15. Position scrim cloth (19) and core (20) in cutout (13). Make sure cloth and plug are seated. Check that plug fits tightly and extends above skin (21).
16. Apply teflon tape (E399) (22) around cutout (13) to protect blade skin (21).



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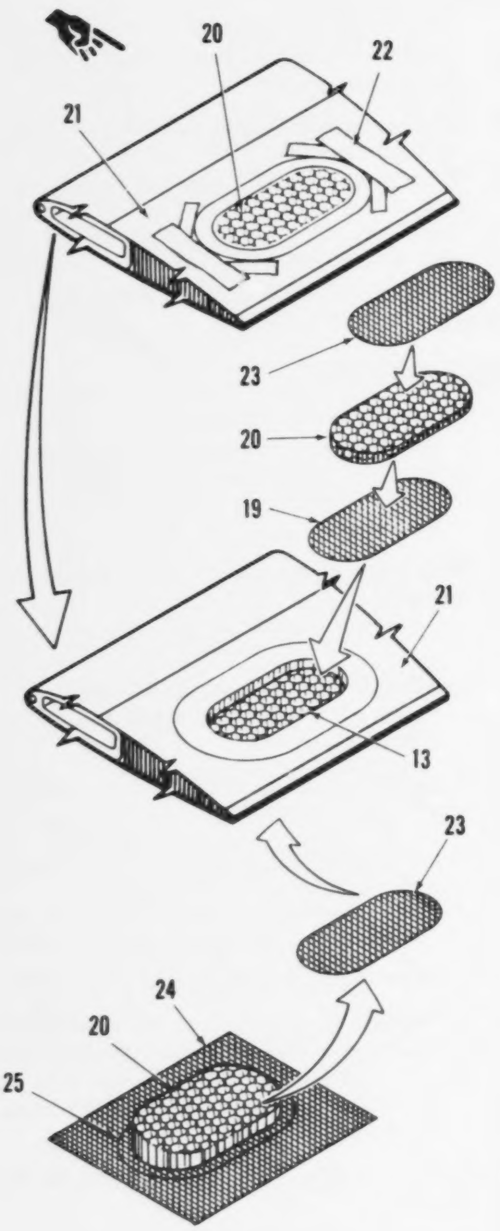
5-69 REPAIR BLADE FAIRING — PARTIAL DEPTH (Continued) 5-69

17. **Sand core (20)** flush with tape (E399) (22). Use sanding block about 2 inches wide and long enough to span length of repair, and abrasive paper (E6). Use spanwise strokes. Remove tape.
18. Matchmark core (20) and skin (21). Remove tape (22), core (20), and scrim cloth (19).
19. **Clean cutout (13).** Use vacuum cleaner.
20. **Prepare skin patch (22)** as follows:
    - a. Position core (20) on piece of fiberglass laminate (E168 or E168.1) (23) with fibers at 45 degrees to chord.
    - b. Draw outline (24) of core (20) on fiberglass laminate (E168 or E168.1) (23) 1 inch larger than core outline. Use pencil compass and straightedge as required. Remove core.
    - c. Cut skin patch (23). Use scissors. Smooth rough edges. Use abrasive paper (E7).
    - d. Check that patch (22) is 1 inch larger than core (20) on all sides. Check that blade surface finish is removed 1/2 inch around patch.
    - e. Trace patch outline (25) onto skin (21).
    - f. If fiberglass laminate (E168.1) is used for patch (23), remove peel ply from patch surfaces. Clean with acetone (E20). Wipe dry with clean cloth (E120).



g. **Sand both sides of patch (22)** to remove surface glaze. Use abrasive paper (E9).

NOTE

Patch will not adhere if surface glaze is not removed.

21. **Clean core (20) and cutout (13).** Use vacuum cleaner.
22. Wear gloves (E186). Clean core (20), cutout (13), scrim cloth (19) and skin (21) where finish was removed. Use cloth (E120) damp with acetone (E20). Wipe dry with a clean cloth. Do not remove gloves.

INSPECT

APPLY ADHESIVE

NOTE

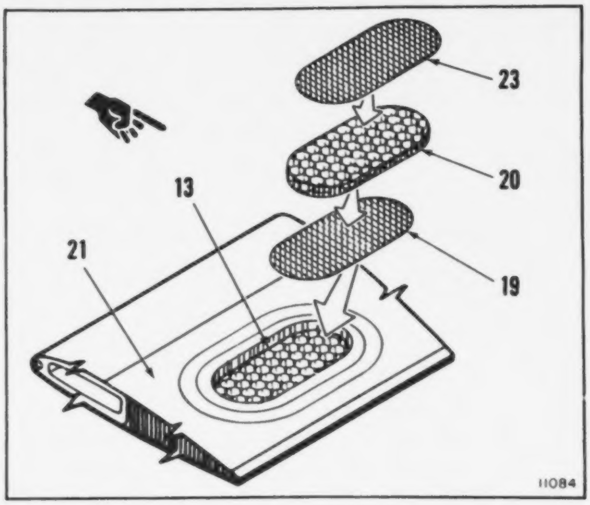
Prepackaged adhesive (E40) is preferred. Use adhesive (E41, E43 or E47.1) only if prepackaged kit is not available.

23. **Mix tube of adhesive (E40).** Follow instructions on kit.

CAUTION

Weigh and mix adhesive and resin accurately to produce acceptable bond.

24. If adhesive (E40) is not available, prepare adhesive (E41) as follows:
    a. Weigh 100 parts of resin and 23 parts of hardener.
    b. Mix polyethylene cup (E157) until color is uniform. Use wood spatula (E424).
25. If adhesive (E43) is used, prepare as follows:
    a. Weigh 7 parts of gray hardener and 5 parts of white base. Use trip balance.
    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).
26. If adhesive (E47.1) is used, prepare as follows:
    a. Weigh equal parts of adhesive (E47.1) and curing agent (E158.1). Use trip balance.
    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).



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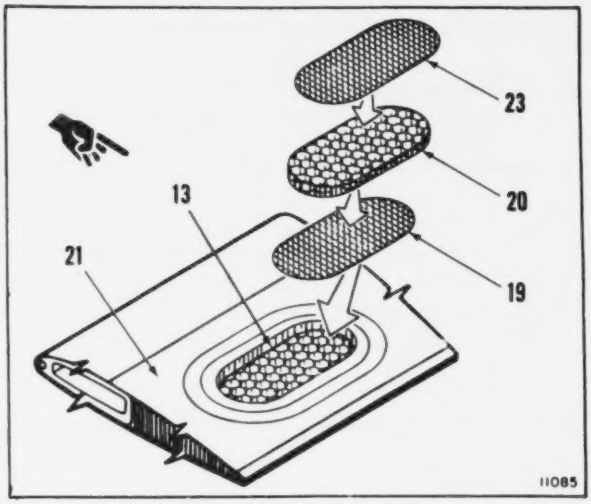
5-69 REPAIR BLADE FAIRING — PARTIAL DEPTH (Continued) 5-69

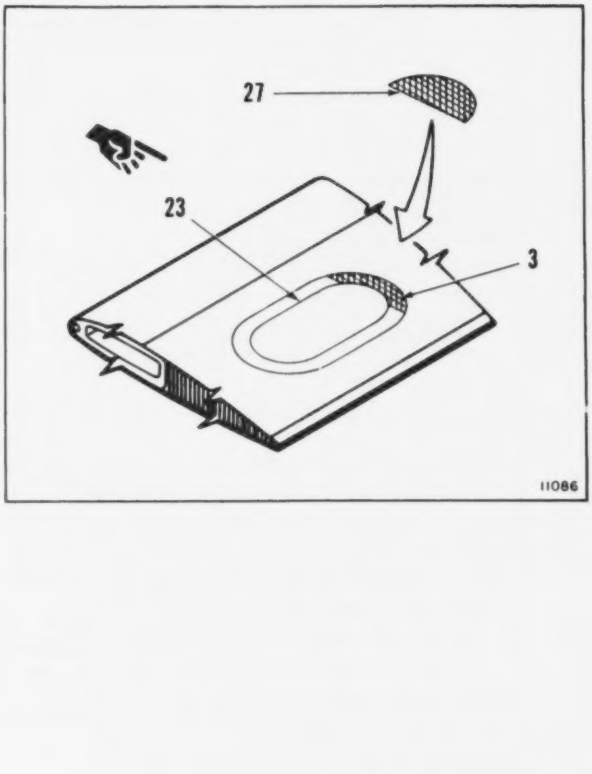
NOTE

Working life of adhesive is 30 minutes .

27. **Apply adhesive (E40, E41, E43, or E47.1) to one side of scrim cloth (E325) (19).** Use stiff brush.
28. **Position scrim cloth (E325) (19)** in cutout (13) with adhesive down.
29. **Coat top of scrim cloth (E325) (19)** and walls of cutout (13). Use adhesive (E40, E41, E43 or E47.1).
30. Align matchmarks on core (20) and skin (21). Press core until it seats completely.
31. **Apply adhesive (E40, E41, E43, or E47.1) to one side of patch (22) and 1 inch outside of cutout (13).** If fiberglass laminate (E168.1) is used, apply adhesive so outer edges of patch curl towards the blade.
32. Center patch (23) over core (20). Position patch with fibers at 45 degrees to chord. Press firmly onto skin (20).



33. If wire mesh diverter damage is more than 1 square-inch , replace mesh (23) as follows.
    a. Cut piece of mesh (E453) (27) to cover patch (23) and exposed mesh (3).
    b. Brush thin coat of adhesive (E40 or E41) over patch (23) and damaged mesh (3).
    c. Position mesh (E453) (27) over patch (23). Seat firmly.



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5-69 REPAIR BLADE FAIRING — PARTIAL DEPTH (Continued) 5-69

34. **Bond fairing repair** (Task 5-68).

NOTE

Partial depth repairs with larger dimension less than 5 inches does not require aluminum sheet backing.

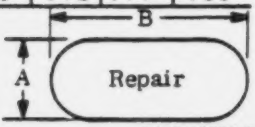
INSPECT

35. **Find weight of repair. Use Adhesive Weight for Single Skin and Core Repair table.** Record weight for blade tracking weight adjustment.

Adhesive Weight for Single Skin and Core Repairs

Width (inches)	Length (inches) B												
A	2	4	6	8	10	12	14	16	18	20	22	24	26
2	12 3 .05	16 4 .07	21 5 .09	26 6 .11	30 7 .12	35 8 .14	40 9 .16	44 10 .18	49 11 .19	54 12 .21	58 13 .23	63 14 .24	67 16 .26
3		20 5 .08	26 6 .11	32 7 .13	37 9 .15	43 10 .17	49 11 .19	54 13 .21	60 14 .23	66 15 .25	72 17 .27	78 18 .29	84 19 .31
4		24 5 .10	30 7 .12	37 9 .15	44 10 .17	51 12 .19	58 13 .22	65 15 .24	72 16 .26	79 18 .29	85 20 .31	93 21 .33	99 23 .36
5			34 8 .14	42 10 .16	50 12 .19	59 13 .22	67 15 .24	75 17 .27	83 19 .30	91 21 .32	99 23 .35	107 25 .38	115 27 .41
6			38 9 .15	47 11 .18	57 13 .21	66 15 .24	76 17 .27	85 19 .30	93 22 .33	103 24 .36	112 26 .39	121 28 .42	131 30 .45
7				52 12 .20	63 14 .23	73 17 .26	84 19 .30	93 22 .33	104 24 .36	115 26 .40	125 29 .43	136 31 .46	146 33 .50
8				57 13 .21	68 16 .25	80 18 .29	92 21 .32	102 25 .36	115 26 .39	126 29 .43	137 32 .47	150 34 .50	161 37 .54
9					74 17 .27	87 20 .31	99 23 .35	112 26 .39	124 29 .43	137 32 .46	150 35 .48	163 37 .54	176 40 .58
10					79 18 .29	93 21 .33	107 24 .37	120 28 .41	135 31 .46	149 34 .50	163 37 .54	176 41 .58	190 44 .63
11						99 23 .35	114 26 .39	129 30 .44	144 33 .49	159 37 .53	174 40 .58	189 44 .62	204 47 .67
12						105 24 .37	121 28 .42	137 32 .47	154 35 .52	170 39 .56	186 43 .61	202 46 .66	218 50 .71
13							128 29 .44	146 33 .49	163 38 .54	180 41 .60	198 45 .65	215 49 .70	232 53 .75
14							135 31 .46	153 35 .52	172 39 .57	190 44 .63	215 49 .70	227 52 .74	246 56 .79
15								160 37 .54	180 42 .60	200 46 .65	220 50 .72	239 55 .77	259 59 .83

Example:
135 - Weight of Base in Grams
31 - Weight of Hardener in Grams
.46 - Total Weight of Repair in Pounds



42 X 51

D145-10734-SPA

FOLLOW-ON MAINTENANCE:
- Refinish repaired area (Task 5-82).
- Adjust balance weights (Task 5-82.1).

END OF TASK

5-69.1 REPAIR BLADE FAIRING — FOAM FILLER 5-69.1

INITIAL SETUP

Applicable Configurations:
All

Tools:
Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Scissors
Sanding Block
Pencil Compass
Router
Vacuum Cleaner
Hole Saw
Hacksaw Blade
Vacuum Pump
Protective Clothing
Respirator
Trip Balance, NSN 6670-00-401-7195
Heat Lamp

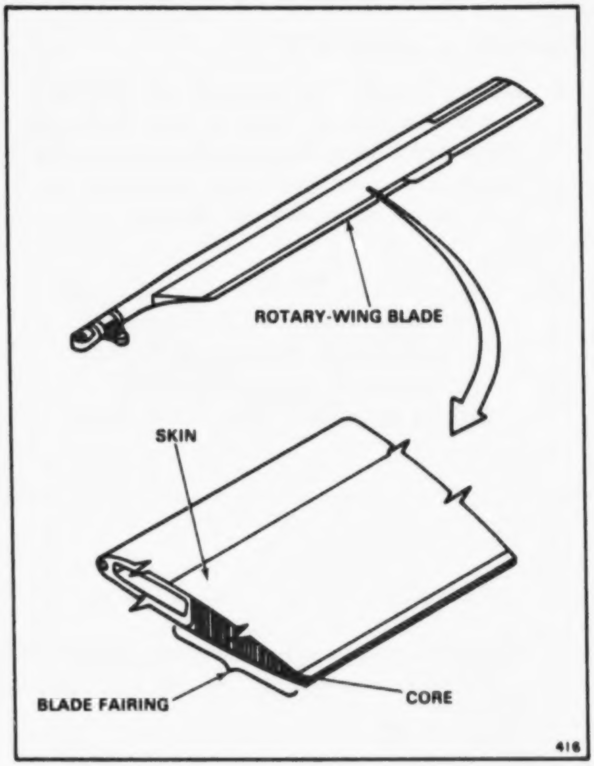
Materials:
Wire Mesh (E453)
Acetone (E20)
Gloves (E186)
Abrasive Paper (E6), (E7), (E9)
Template Paper (E263)
Masking Tape (E388)
Teflon Tape (E399)
Cloth (E120)
Adhesive (E40, E41, E43 or E47.1)
Foam Filler (E172.1)
Polyethylene Cup (E157)
Wood Spatula (E424)
Peel Ply (E270)
Teflon Impregnated Fabric (E170)
Rubber Pad (E318)
Glass Cloth (E132)
Sealing Tape (E396)
Polyvinyl Sheet (E284)
Temperature Indicating Strips (E413)
Fiberglass Laminate (E168 or E168.1)
Curing Agent (E158.1)

Personnel Required:
Aircraft Structural Repairer
Inspector

References:
Task 5-68

Equipment Condition:
Off Helicopter Task

General Safety Instructions:



WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

WARNING

Adhesives (E40, E41, E43 or E47.1) are toxic. They can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

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5-69.1 REPAIR BLADE FAIRING — FOAM FILLER (Continued) 5-69.1

PREPARE DAMAGE AREA

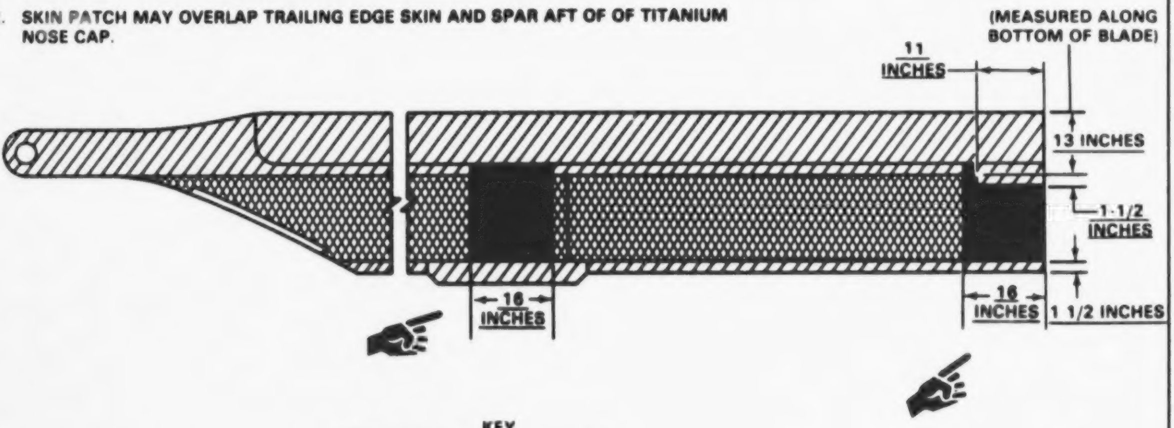
1. **Check location and extent of damage** to one skin and full depth of core. **Refer to Fiberglass Skin Damage Repair Limits figure.** Skin and core below skin must be replaced where repairs are allowed.

NOTE

Foam repairs are limited to a maximum dimension of 4 inches . If damage exceeds 4 inches in diameter, make a single skin repair (Task 5-68).

NOTES

1. FOAM REPAIR LIMITED TO A MAXIMUM OF 4 INCHES IN DIAMETER.
2. SKIN PATCH MAY OVERLAP TRAILING EDGE SKIN AND SPAR AFT OF OF TITANIUM NOSE CAP.


(MEASURED ALONG BOTTOM OF BLADE)
11 INCHES
13 INCHES
1-1/2 INCHES
16 INCHES
16 INCHES
1 1/2 INCHES

KEY

▨ REPAIR NOT APPLICABLE

■ WIRE MESH REPAIRS LARGER THAN 1 SQ INCH REQUIRE REPLACEMENT OF DAMAGED MESH.

▩ CORE REPAIR PERMITTED

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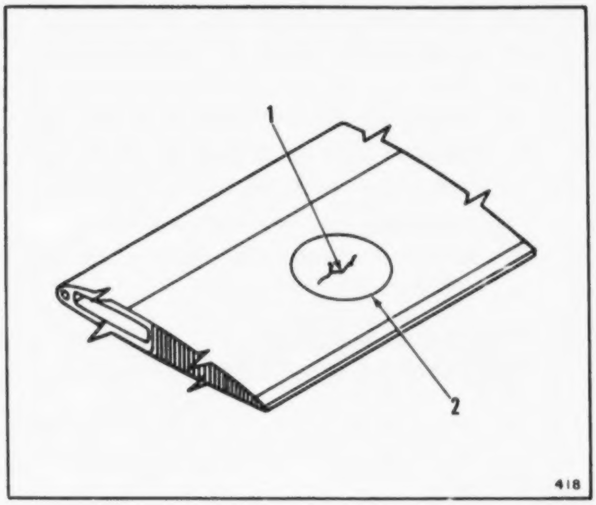
5-69.1 REPAIR BLADE FAIRING — FOAM FILLER (Continued) 5-69.1

2. **Outline damage area (1).** Make circle or oblong outline (2). Damage removal area shall have no corners.

CAUTION

Do not wash contaminants into damage area if acetone (E20) is used to soften finish. Contaminants can prevent satisfactory repair.

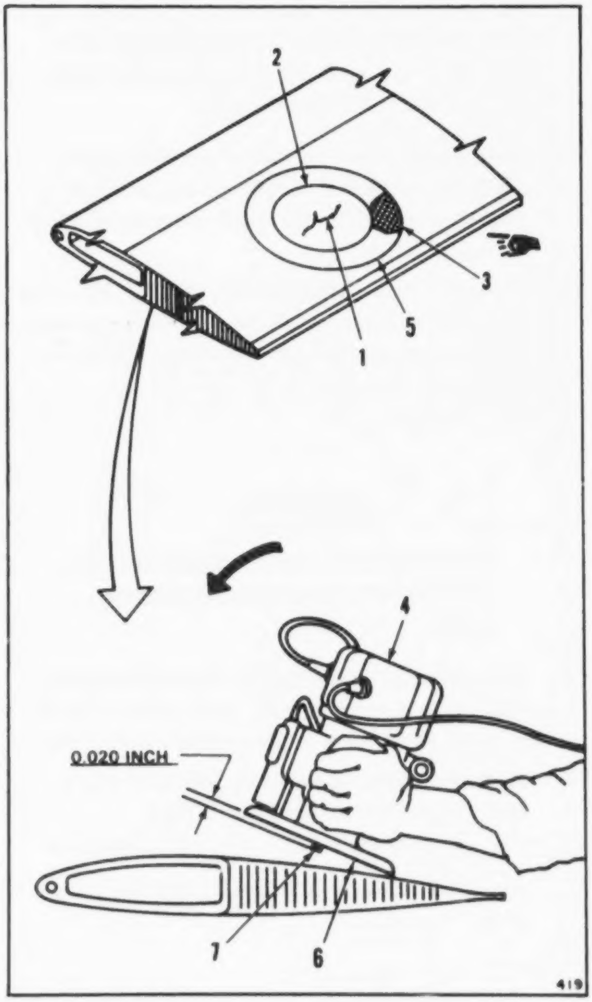


3. **Remove finish 1 1/2-inches outside of outline (2)** around damage. Use sanding block and abrasive paper (E6). Use acetone (E20), if needed to soften finish. Complete finish removal. Use abrasive paper (E7). Do not sand through wire mesh.
4. If wire mesh diverter (3) must be replaced, expose wire mesh 1 1/2-inches outside of damage area.
5. **If router is not available, go to step 6 or 7.** If router is used to remove damaged skin, proceed as follows:
   a. **Draw line (5) around outline (2).** Space outer line (5) so outer edge of router base (6) will follow it while router bit (7) follows outline (2). Use pencil compass and straightedge. If damage area (1) will not support compass point, cover area. Use template paper (E263) and masking tape (E388). Remove paper and tape.
   b. Install router bit (7). Set depth to 0.020 inch .

WARNING

Wear goggles, respirator, and protective clothing when using router. Fiberglass particles will irritate eyes, lungs, and skin.

   c. Start router (4). Keep router under control. Use both hands.



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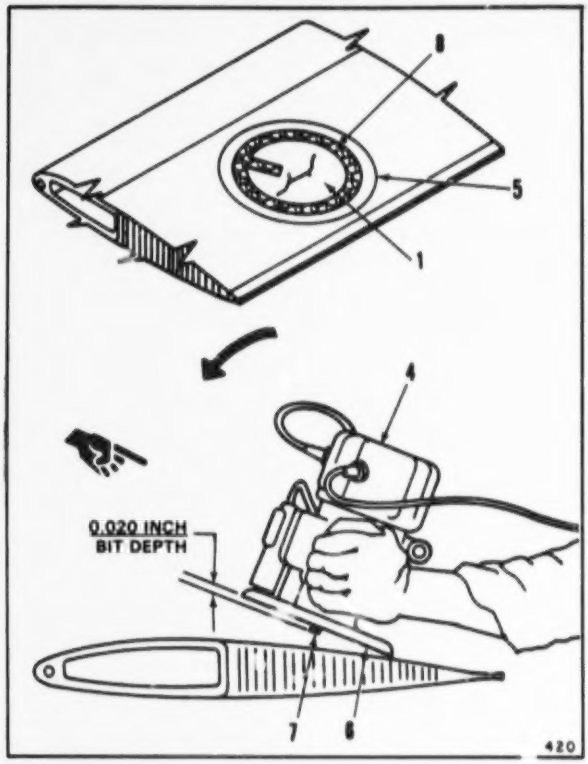
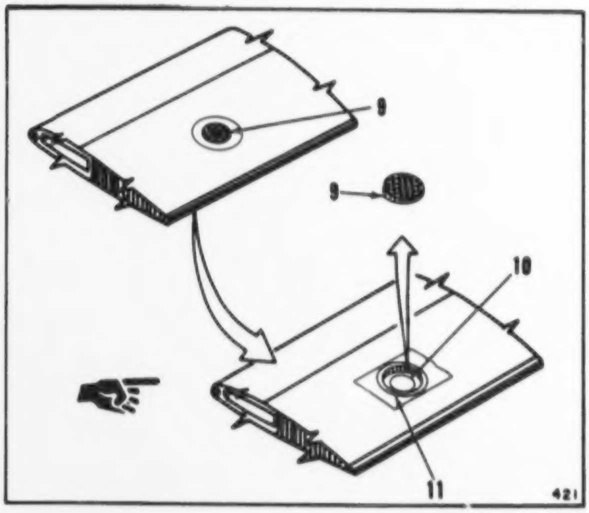


   d. Rest edge of router base (6) on router guide line (5). Keep bit (7) above blade skin.
   e. Slowly lower bit (7) onto blade skin (8). Keep edge of router base (6) on guide line. Move router (4) counterclockwise.
   f. Complete cut and move router (4) to center of damage area (1). Turn router off and remove it.

6. **If hole saw is used to remove damaged skin (1), proceed as follows:**

   a. Use hole saw with center drill that does not extend more than 1/4-inch beyond saw.
   b. Position hole saw on guide line (5). Cut only deep enough to go through skin (8). Hold saw lightly against skin and turn slowly. Use wrench.

7. **If knife is used to remove damaged skin (1), make a series of punctures along guide line (2) until damaged skin is separated.**
8. **Peel off cut-out section of skin (8).** Use pliers and chisel. Work from center outward. Prying against skin around repair will cause additional damage.



CAUTION

Do not cut or score opposite skin when removing damaged core.

9. **Cut through core (9) to opposite skin (10).** Use pen knife with blunt point. Cut only deep enough to separate damaged core.
10. **Remove damaged core (9).** Use pliers and chisel. Avoid damage to skin.
11. Clean cutout (10). Use vacuum cleaner.
12. Apply teflon tape (E399) (11) around cutout (10).

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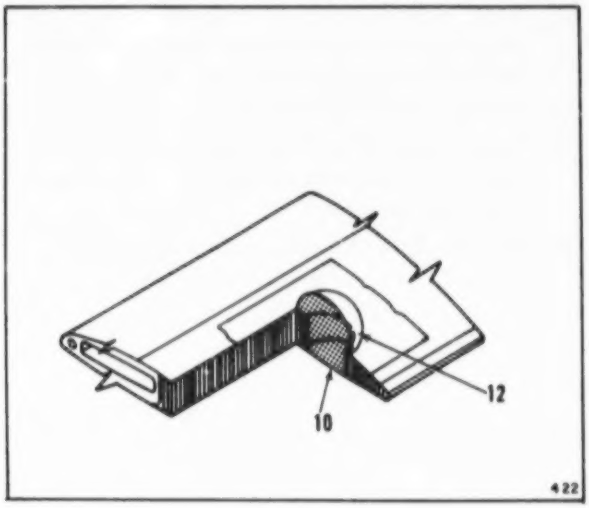
5-69.1 REPAIR BLADE FAIRING — FOAM FILLER (Continued) 5-69.1



13. Prepare and use a mixture of foam filler (E172.1) as follows:

WARNING

Foam ingredients give off toxic fumes. Skin contact can cause irritation. Work in a well-ventilated area. Wear goggles and protective gloves. In case of skin contact, wash immediately with soap and water.

NOTE

A total poured weight of 20 grams (0.75 ounce) will fill a 2-inch hole at the maximum blade thickness. The foam will expand to 8 times its original liquid volume.

a. **Prepare a mixture of foam filler (E172.1).** Mix equal parts by volume of resin PEW and activator PEA in a polyethylene cup (E157). Stir vigorously for 15 seconds maximum. Use a wooden spatula (E24).

NOTE

Working life of the mixture is about 1 minute .

b. **Pour mixture into cutout (10).** Allow it to expand and overflow.

c. **Let expanded foam harden** for at least 30 minutes . When hard, cut off overflow (12) slightly above blade surface. Use a hacksaw blade.

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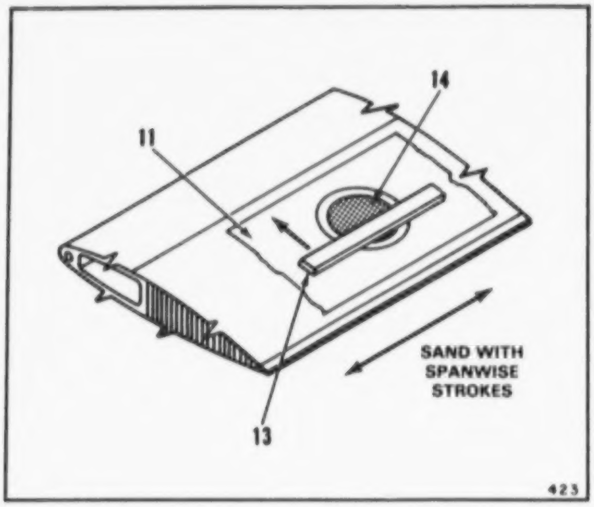
14. Bond a piece of 120 or 240-grit abrasive paper (E7 or E9) to a sanding block (13). Make the block about 2 inches wide and long enough to span the repair.
15. **Sand foam plug (14) flush** with blade surface to match blade contour. Use very light spanwise strokes.
16. Remove tape (11) from around repair.



17. Prepare fiberglass skin patch (15) as follows:
    a. **Cut patch (14) of fiberglass laminate (E168 or 168.1)** 2 inches larger than foam plug (14). Use scissors. Smooth rough edges by sanding.
    b. Center patch (15) over foam plug (14). Check that finish has been removed at least 1/2-inch beyond patch.
    c. Draw outline of patch (15) on blade surface.
    d. **Lightly sand patch (15)** to remove surface glaze. Use 240-grit abrasive paper (E9). Remove peel ply from patch if necessary.

NOTE

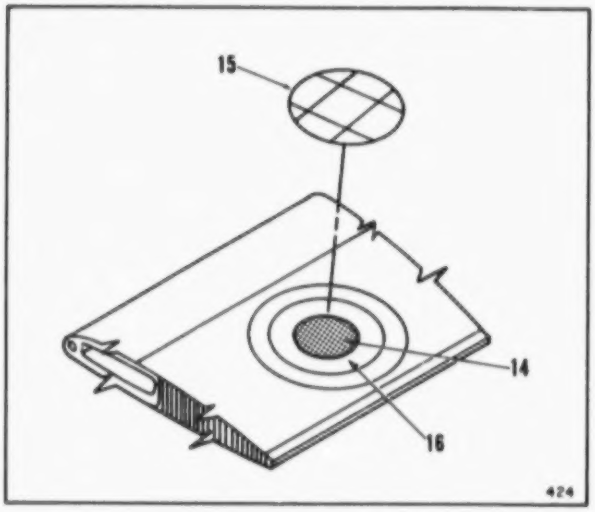
Patch will not adhere if surface glaze is not removed.

    e. Put on protective gloves (E186). Gloves shall be worn during the remaining steps of this procedure.

NOTE

Do not soak blade with acetone. Use damp cloths only.

    f. **Clean patch (15) and bonding surface (16)** of blade. Use cloths (E120) damp with acetone (E20). Wipe acetone dry immediately. Use dry cloth (E120). Check patch and bonding surface to ensure that they are properly prepared.



INSPECT

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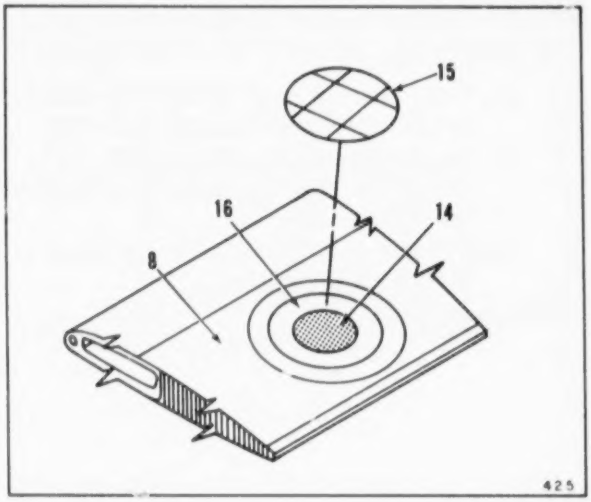
5-69.1 REPAIR BLADE FAIRING — FOAM FILLER (Continued) 5-69.1



APPLY ADHESIVE

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41, E43 or E47.1) only if prepackaged kit is not available.

18. **Mix tube of adhesive (E40).** Follow instructions on kit.
19. If adhesive (E40) is not available, prepare adhesive (E41) as follows:
    a. Weigh 100 parts of resin and 23 parts of hardener. Use trip balance.
    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).
20. If adhesive (E43) is used, prepare as follows:
    a. Weight 7 parts of gray hardener and 5 parts of white base. Use trip balance.
    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).
21. If adhesive (E47.1) is used, prepare as follows:
    a. Weigh equal parts of adhesive (E47.1) and curing agent (E158.1). Use trip balance.
    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

NOTE

Working life of adhesive is 30 minutes .

22. If fiberglass laminate (E168.1) is used, place patch (15) so that the outer edges curl toward the blade.
23. **Apply adhesive (E40, E41, E43 or E47.1)** to bottom of patch (15). Use stiff brush.
24. **Apply adhesive to foam plug (14) and bonding surface (16).** Center patch over plug, within outline. Position patch with fibers at 45° to blade. Press onto skin (8). If wire mesh diverter damage is less than 1 square-inch , go to step 26.

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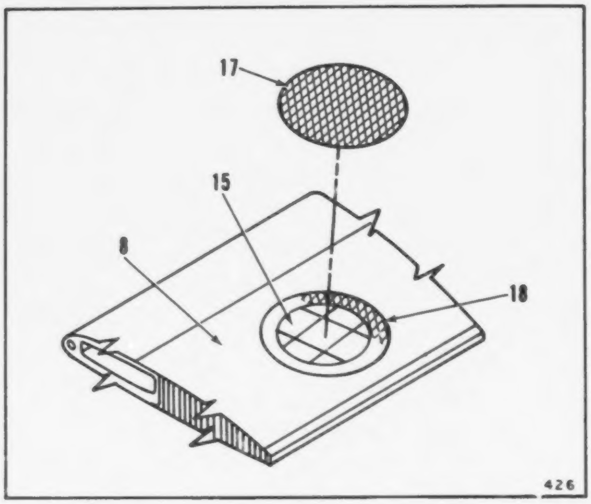
25. If wire mesh diverter damage is more than 1 square-inch , replace mesh (17) as follows:

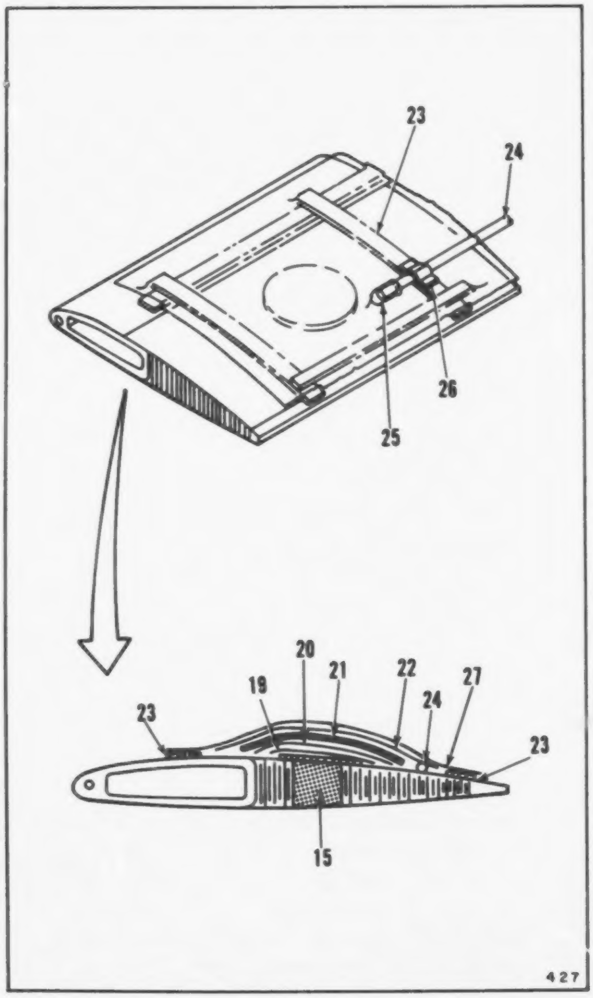
   a. Cut a piece of mesh (E453) (17) to cover patch (15) and exposed mesh (18).
   b. Brush thin coat of adhesive (E40, E41, E43 or E47.1) over patch (15) and damaged mesh (18).
   c. Position mesh (E453) (17) over patch (15). Seat firmly.



BOND FAIRING REPAIR

26. **Bond fairing repair as follows:**

   a. Cover repair with layer of peel ply (E270) (19) and layer of teflon-impregnated fabric (E170) (20). Make layers large enough to overlap patch (15) 1 inch .
   b. Cover teflon-impregnated fabric (20) with thick rubber pad (E318) (21).
   c. Cover repair area with fiberglass cloth (E132) (22). Cut cloth large enough to cover rubber pad (E318) (21).
   d. Surround cloth (E132) (22) with sealing tape (E396) (23). Keep tape clear of cloth.
   e. Attach tube (24) to vacuum pump hose.
   f. Wrap tube (24). Use two layers of fiberglass cloth (E132) (25). Apply masking tape (E388) over cloth.
   g. Position tube (24) on cloth (E132) (22) covering repair. Wrap tube with sealing tape (E396) (26) where tube crosses sealing tape (23) already applied.
   h. Press tube (24) onto tape (26) to make airtight seal.
   i. Press polyvinyl sheet (E284) (27) smoothly onto tape (23) to make airtight seal.



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j. Start vacuum pump. Check for leaks. Reposition polyvinyl sheet (E284) (27) or add tape (E396) (23) as needed.

k. Maintain 20-inches Hg vacuum through adhesive cure.

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.

l. Cure adhesive at 140 - 160°F (60 - 71°C) 2 hours . Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

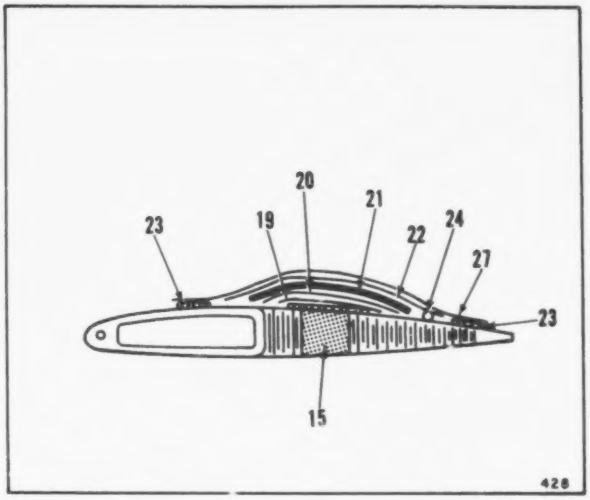
NOTE

Serviceable cure can be achieved without heat at 70 - 80°F (21 - 27°C) in 24 hours . Vacuum may be removed after 12 hours .

m. Turn off vacuum pump.

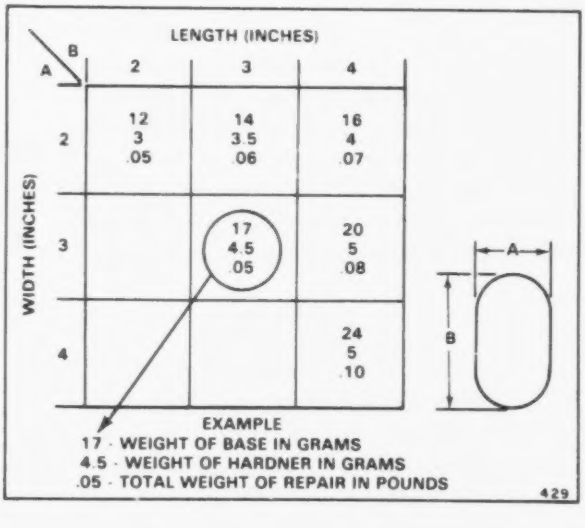
n. Remove peel ply (19), fabric (20), rubber (21), fiberglass (22), tape (23), tube (24), and sheet (27).

o. If squeezeout fairing is not satisfactory, fair patch (15). Use adhesive (E40, E41, E43 or E47.1). Follow steps 18, 19, 20 or 21 to mix adhesive.



INSPECT

27. Find weight of repair in table. Record weight for blade tracking weight adjustment.



LENGTH (INCHES)

A \ B WIDTH (INCHES)	2	3	4
2	12 3 .05	14 3.5 .06	16 4 .07
3		17 4.5 .05	20 5 .08
4			24 5 .10

EXAMPLE
17 - WEIGHT OF BASE IN GRAMS
4.5 - WEIGHT OF HARDNER IN GRAMS
.05 - TOTAL WEIGHT OF REPAIR IN POUNDS

FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).

Adjust blade tracking weights (Task 5-82.1).

END OF TASK

5-70 REPAIR BLADE FAIRING — DOUBLE SKIN 5-70

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer Tool Kit,
NSN 5180-00-323-4876
Sanding Block
Pencil Compass
Straightedge
Router
Router Bit, Four-Fluted, A2154108
Vacuum Cleaner
Hole Saw
Vacuum Pump
Protective Clothing
Respirator
Trip Balance,
NSN 6670-00-401-7195
Heat Lamp

Materials:

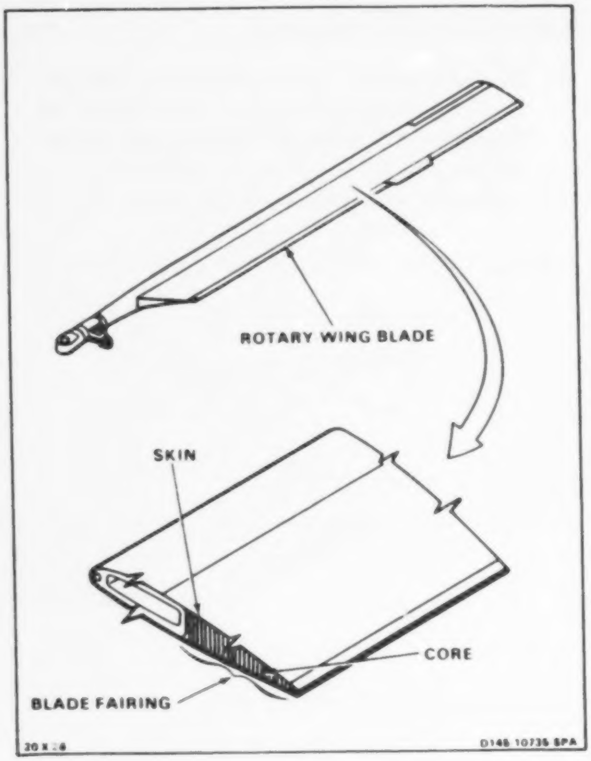
Wire Mesh (E453)
Acetone (E20)
Gloves (E186)
Abrasive Paper (E6, E7, E9)
Template Paper (E263)
Masking Tape (E388)
Teflon Tape (E399)
Aluminum (E70)
Cloth (E120)
Adhesive (E40), or
Adhesive (E41)
Polyethylene Cup (E157)
Wood Spatula (E424)
Peel Ply (E270)
Teflon-Impregnated Fabric (E170)
Rubber Pad (E318)
Glass Cloth (E130)
Sealing Tape (E396)
Polyvinyl Sheet (E284)
Temperature Indicating Strips (E413)
Fiberglass Laminate (E168 or E168.1)

Personnel Required:

Aircraft Structural Repairer
Inspector

Equipment Condition:

Off Helicopter Task



General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Adhesive (E40 or E41) is extremely flammable. It is volatile. It forms harmful vapors and explosive peroxides. Keep away from heat, sparks, or open flame. Avoid inhaling. Use only with adequate ventilation.

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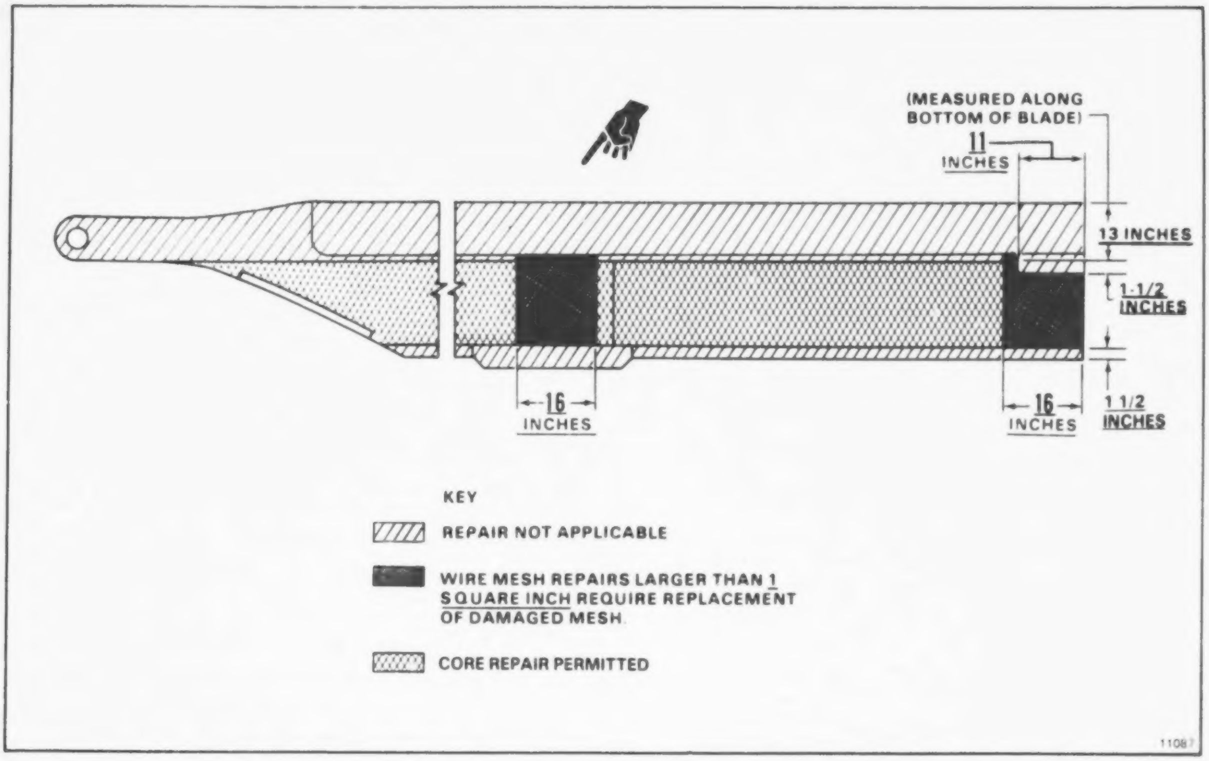
5-70 REPAIR BLADE FAIRING — DOUBLE SKIN (Continued) 5-70

PREPARE DAMAGED AREA

1. **Check location and extent of damage** to one skin and full depth of core. **Refer to Fiberglass Skin Damage Repair Limits figure.** Skin and core below skin must be replaced where repairs are allowed.

NOTE

Skin patch can overlap trailing edge skin and spar aft of titanium nose cap.


(MEASURED ALONG
BOTTOM OF BLADE)
11 INCHES
13 INCHES
1-1/2 INCHES
16 INCHES
16 INCHES
1 1/2 INCHES
KEY
▨ REPAIR NOT APPLICABLE
■ WIRE MESH REPAIRS LARGER THAN 1 SQUARE INCH REQUIRE REPLACEMENT OF DAMAGED MESH
▒ CORE REPAIR PERMITTED
11087

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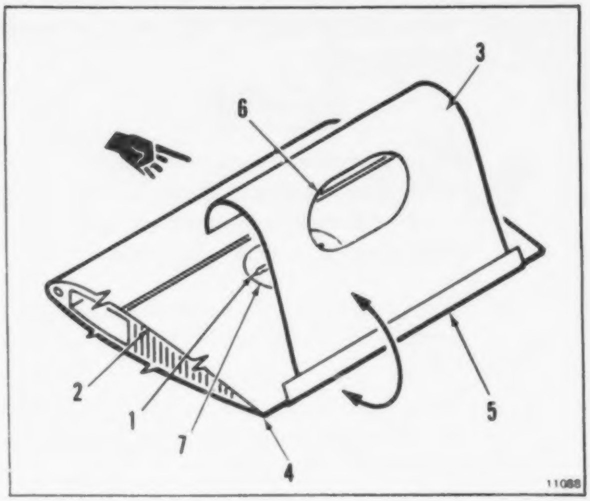
2. Mark damage areas (1) on fairing (2). If damage areas vary in size, or are offset, proceed as follows:

   a. Cover fairing (2) on side with greatest damage. Use template paper (E263) (3). Align one edge with trailing edge (4). Apply tape (E388) (5) as hinge.
   b. Draw outline (6) of damaged area (1) on paper (E263) (3). Use pencil compass and straightedge, if needed.
   c. Cut-out paper (E263) (3) on outline (6).
   d. Flip paper (E263) (3) around to other side of fairing (2).
   e. Check that cutout (6) covers damage area on other side of fairing (2). If not, enlarge cutout (6) as required.
   f. Draw outline (7) of cutout (6) on both sides of fairing.

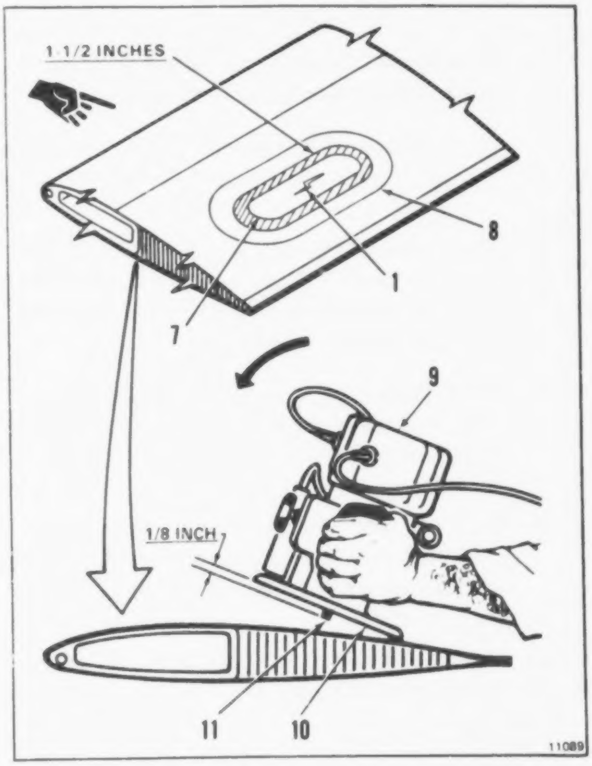


3. **Remove finish 1 1/2-inches outside of outline (7)** around damage. Use sanding block and abrasive paper (E6). Use acetone (E20), if needed to soften finish. Complete finish removal with abrasive paper (E7). Do not sand through wire mesh. Wear gloves (E186).
4. If wire mesh diverter must be replaced, expose wire mesh 1 1/2-inches outside of damaged area.
5. **If router (9) is used to remove damaged skin, proceed as follows:**

   a. **Draw line (8) around outline (7).** Space outer line (8) so router base (10) will follow it while router bit (11) cuts along outline (7). Use pencil compass and straightedge. If damaged area (1) will not support compass point, cover area. Use template paper (E263) and masking tape (E388). Remove paper and tape.

NOTE

Using a 6 inch diameter router base and 1/2 inch bit, line (8) should be 2 3/4 inches outside of outline (7).



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b. Install router bit (11). Set depth to about 0.020 inch .

WARNING

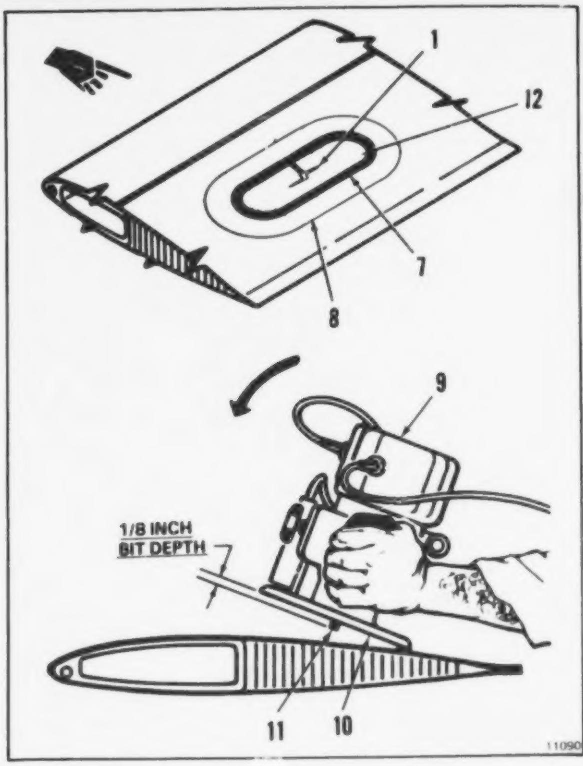
Wear goggles, respirator, and protective clothing when using router. Fiberglass particles will irritate eyes, lungs, and skin.

c. Start router (9). Keep router under complete control. Grasp handles using both hands.

d. Rest edge of router base (10) on router guide line (8). Keep bit (11) above blade skin (12).

e. Slowly lower bit (11) onto blade skin (12). Keep edge of router base (10) on guide line. Move router (9) counterclockwise.

f. Complete cut and move router (9) to center of damaged area (1). Turn router off and remove it.



6. **If hole saw is used to remove damaged skin,** proceed as follows:

   a. Use hole saw with center drill that does not extend more than 1/4-inch beyond saw.

   b. Position hole saw on guide line (7). Cut only deep enough to go through skin (12). Hold saw lightly against skin and turn slowly. Use wrench.

7. **If knife is** used to remove damaged skin (12), make a series of punches through skin along guide line (7) until damaged skin is separated.

8. **Peel off cut-out section of skin (12).** Peel from center of damage area (1). Do not pry against undamaged fairing skin. Use pliers and chisel.

9. Repeat steps 5, 6, or 7 for skin (12) on opposite side of blade.

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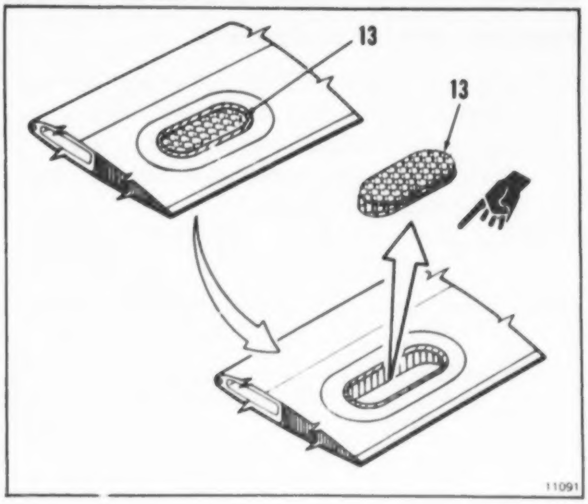
5-70 REPAIR BLADE FAIRING — DOUBLE SKIN (Continued) 5-70

10. Cut through core (13). Use pocket knife.
11. Remove core (13).



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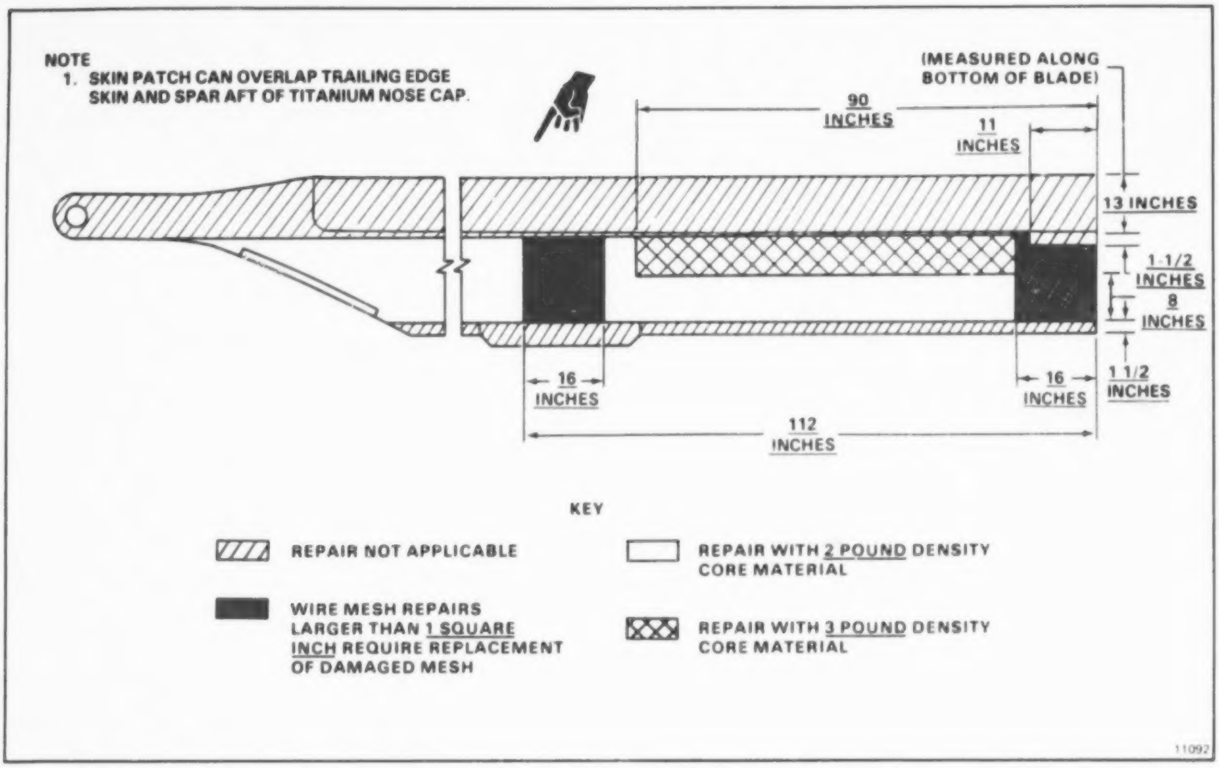
PREPARE REPAIR MATERIALS

12. Use core material (E145) in 3-pound density repair area. Use core material (E146) in 2-pound density repair area. Refer to **Fiberglass Blade Skin and Core Damage Repair Limits figure.**



NOTE
1. SKIN PATCH CAN OVERLAP TRAILING EDGE SKIN AND SPAR AFT OF TITANIUM NOSE CAP.

(MEASURED ALONG BOTTOM OF BLADE)
90 INCHES
11 INCHES
13 INCHES
1-1/2 INCHES
8 INCHES
1 1/2 INCHES
16 INCHES
16 INCHES
112 INCHES
KEY
▨ REPAIR NOT APPLICABLE
■ WIRE MESH REPAIRS LARGER THAN 1 SQUARE INCH REQUIRE REPLACEMENT OF DAMAGED MESH
☐ REPAIR WITH 2 POUND DENSITY CORE MATERIAL
▩ REPAIR WITH 3 POUND DENSITY CORE MATERIAL
11092

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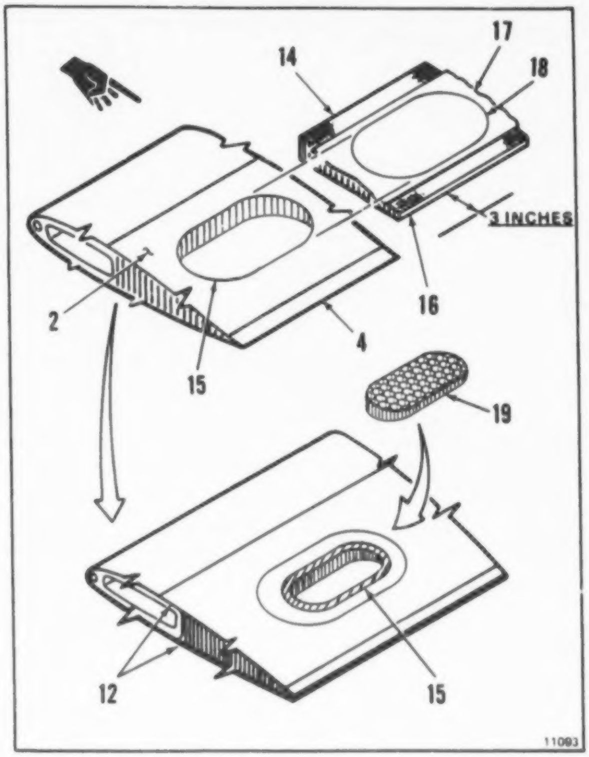
5-70 REPAIR BLADE FAIRING — DOUBLE SKIN (Continued) 5-70

13. **Position core material (E145 or E146) (14) on fairing (2)** next to cutout (15). Locate trailing edge (16) of core material 3-inches forward of blade trailing edge (4).
14. **Apply masking tape (E388) (17)** to cover area of core material (E145 or E146) (14) slightly larger than cutout area.
15. **Draw outline (18) on tape (E388) (17)** in shape of cutout (15) and 1/8-inch larger.

NOTE

Repair plug must have same contour as blade and be slightly larger than cutout.

16. **Cut core material (E145 or E146) (14)** on tape outline (18) with knife. Remove tape (E388) (17).
17. **Position core (19) in cutout (15).** Check that core fits tight and projects above and below skin (12) at all points.
18. **Remove core (19) from cutout (15).**



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19. **Prepare two skin patches (20)** as follows:
    a. Position fiberglass laminate (E168) or (E168.1) (21) over cutout (15) with fibers at 45 degrees to chord.
    b. Draw outline of cutout (15) on fiberglass laminate (E168) (21). Remove laminate. Draw outline (22) 1-inch larger than cutout outline on fiberglass laminate. Use pencil compass and straightedge.
    c. Cut skin patches (20) with scissors. Smooth rough edges with abrasive paper (E7).
    d. If fiberglass laminate (E168.1) is used, remove peel ply from surfaces of patches (20). Clean with acetone (E20). Wipe dry with clean cloth (E120).
    e. Sand patches (20) lightly. Use abrasive paper (E9).

NOTE

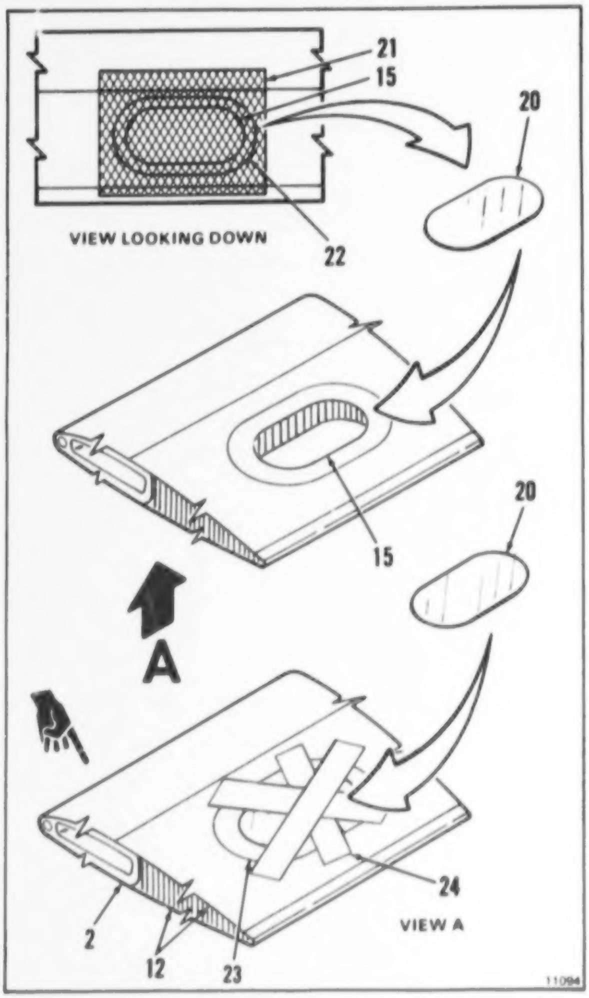
Patch will not adhere if surface glaze is not removed.

    f. Check that patches (20) are 1-inch larger than cutout (15) on all sides. Check that blade surface finish is removed 1/2-inch around patches.
    g. Trace patch outline (23) onto blade skin (12).

NOTE

These outlines will be used when applying adhesive and for positioning patches for bonding.

    h. Tape patch (20) on bottom of fairing (2). Use masking tape (E388) (24).



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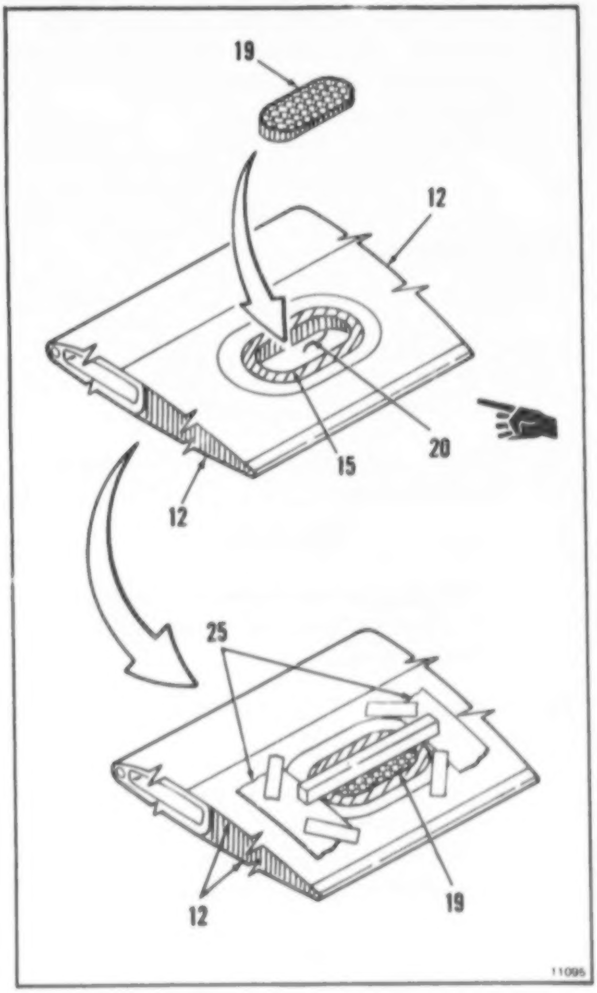
5-70 REPAIR BLADE FAIRING — DOUBLE SKIN (Continued) 5-70

20. Insert core (19) in cutout (15). Seat it firmly on bottom patch (20). Be careful not to push patch away from lower skin (12).
21. Bond a piece of abrasive paper (E7) to a sanding block about 2 inches wide and long enough to span the repair in a spanwise direction.
22. Apply teflon tape (E399) (25) around area of finish removal.
23. Using spanwise strokes, sand core (19) to height of tape (E399) (25). Do not push down too hard. If necessary, support lower patch (20) with hand.
24. Remove tape (E399) (25) and lower patch (20).
25. Index core (19) and skin (12). Remove core.



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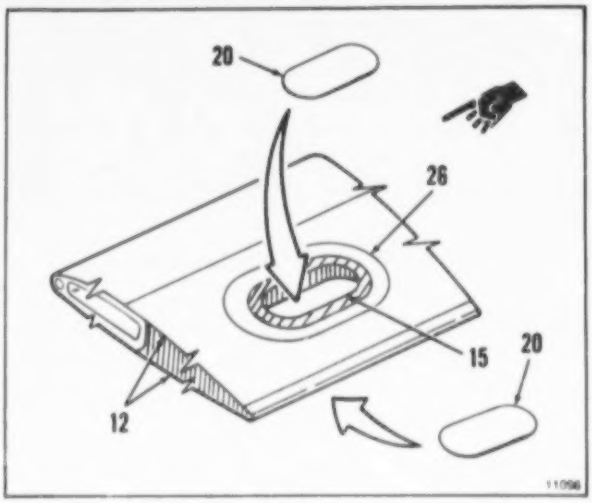
5-70 REPAIR BLADE FAIRING — DOUBLE SKIN (Continued) 5-70

26. Wear gloves (E186). **Clean cutout (15), patches (20) and skin (12) where finish was removed.** Use cloth (E120) damp with acetone (E20). Wipe dry with clean cloth (E120). Do not remove gloves.



INSPECT

APPLY ADHESIVE

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41) only if prepackaged kit is not available.

27. **Mix tube of adhesive (E40).** Follow instructions on kit.

CAUTION

Weigh and mix adhesive and resin accurately to produce acceptable bond.

28. If adhesive (E40) is not available, prepare adhesive (E41) as follows:

    a. Weigh 100 parts of resin, and 23 parts of hardener. Mix in polyethylene cup (E157) until color is uniform. Use wood spatula (E424). Wear gloves (E186).

NOTE

Working life of adhesive is 30 minutes .

29. Apply adhesive (E40 or E41) to one patch (20) and 1-inch wide area (26) around cutout (15). Use stiff brush. Wear gloves (E186). If fiberglass laminate (E168.1) is used, apply adhesive so edges of patch curl toward blade.

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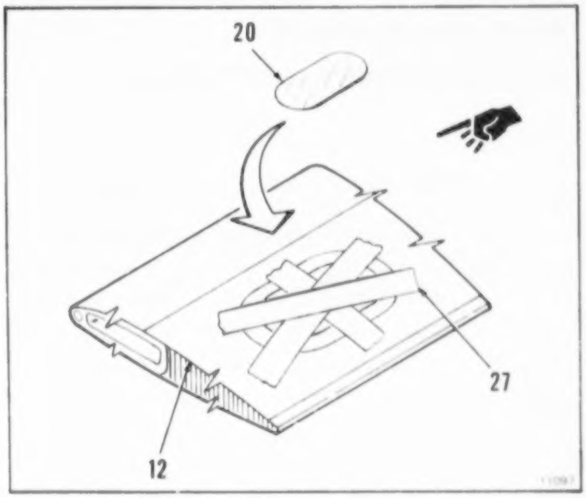
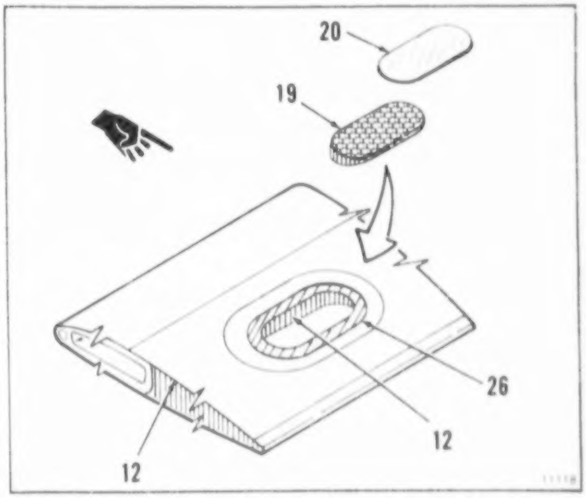
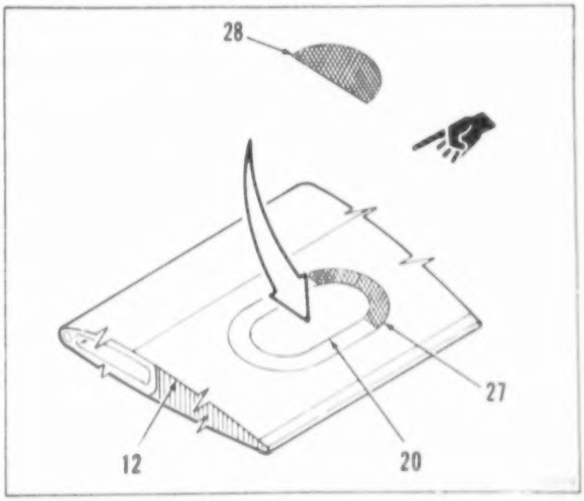
30. Position patch (20) over cutout. Center patch on adhesive coat. Position patch with fibers at 45 degrees to blade chord. Press firmly onto skin (12).
31. Tape patch (20) in place. Use teflon tape (E424) (27).



32. **Apply adhesive (E40 or E411)** to honeycomb sides of cutout (15). Use stiff brush. Wear gloves (E186).
33. **Align match marks on core (19) and skin (12). Insert core** until seated on bottom patch. Check that core is flush with skin.
34. **Put on gloves (E186). Apply adhesive to core (19), blade skin area (26), where finish was removed,** and one side of **patch (20).** Center patch over insert, within outline. Position patch with fibers at 45 degrees to blade chord. Press onto skin (12).



35. If wire mesh diverter damage is less than 1 square-inch, go to step 36. If wire mesh diverter damage is more than 1 square-inch, replace mesh as follows:
    a. Cut piece of mesh (E453) (28) to cover patch (20) and exposed mesh (29).
    b. Brush thin coat of adhesive (E40 or E41) over patch (20) and damaged mesh (29). Wear gloves (E186).
    c. Position mesh (E453) (28) over patch (20). Seat firmly. Brush more adhesive over mesh. Fair adhesive to blade skin (12).



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5-70 REPAIR BLADE FAIRING — DOUBLE SKIN (Continued) 5-70

BOND FAIRING REPAIR

36. **Bond fairing repair as follows:**

NOTE

Wear gloves (E186) for all steps.

a. Cover repairs with layers of peel ply (E270) (30) and layers of teflon-impregnated fabric (E170) (31). Make layers large enough to overlap patch 1 inch.

b. Cover teflon-impregnated fabric (E170). Use thick rubber pad (E318) (32).

c. Cover repair areas. Use fiberglass cloth (E130) (33). Cut cloth large enough to cover rubber pad (E318) (32). Overlap cloth over trailing edge onto opposite patch.

d. Border cloth (E130) (33) on three sides with sealing tape (E396) (34). Keep tape clear of cloth. Apply tape around trailing edge to other side.

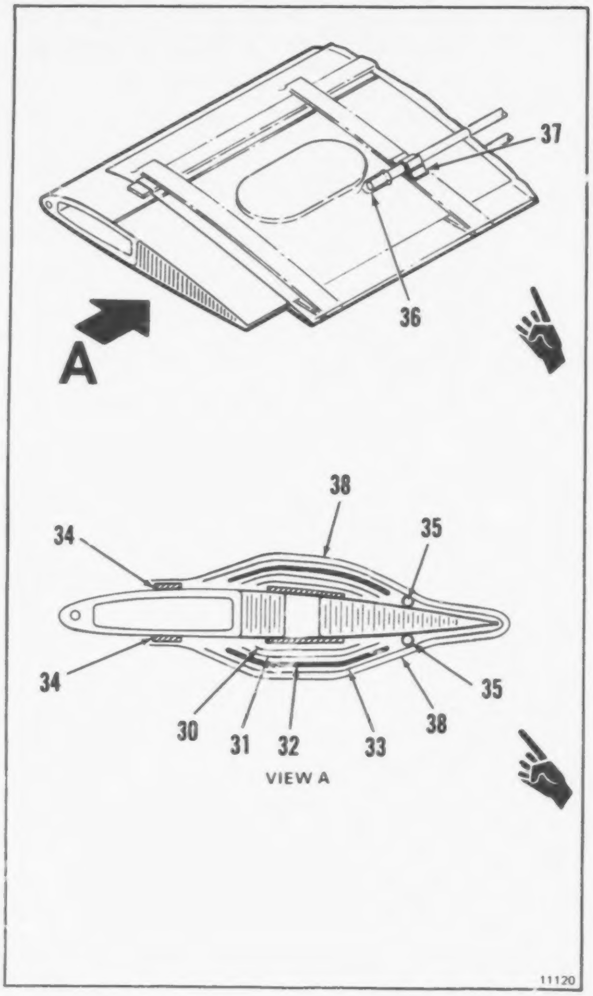
e. Attach two tubes (35) to vacuum pump hose.

f. Wrap each tube (35). Use two layers of fiberglass cloth (E130) (36). Secure cloth to tube with masking tape (E388).

g. Position one tube (35) on cloth (E170) (33) covering repair on top and bottom of blade. Wrap each tube with sealing tape (E388) (37) where tube crosses sealing tape already applied.

h. Press tubes (35) onto tape (34) to make airtight seal.

i. Press polyvinyl sheet (E284) (38) smoothly onto tape (34) to make airtight seal.



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5-70 REPAIR BLADE FAIRING — DOUBLE SKIN (Continued) 5-70

j. Start vacuum pump. Check for leaks. Reposition polyvinyl sheet (E284) (38) or add tape (E396) (34) as needed.

k. Maintain 20 inches Hg vacuum through adhesive cure.

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass blade can occur.

l. Cure adhesive at 140°F to 160°F (60°C to 71°C) for 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

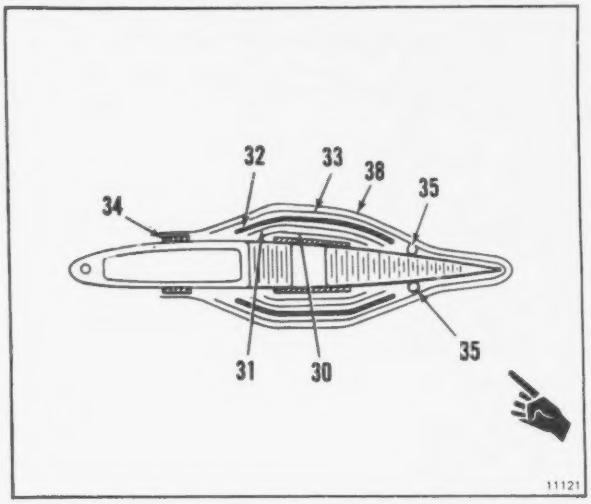
NOTE

Serviceable cure can be achieved without heat at 70°F to 80°F (21°C to 27°C) in 24 hours. Vacuum may be removed after 12 hours.

m. Turn off vacuum pump.

n. Remove sheet (38), tubes (35), tape (34), fiberglass (33), rubber (32), fabric (31), and peel ply (30).

o. If squeezeout fairing is not satisfactory, fair patch. Use adhesive (E40 or E41). Follow steps 27 or 28 to mix adhesive.



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37. **Find weight of repair. Use adhesive weight for double skin core repairs.**

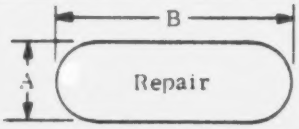
Record weight for blade tracking weight adjustment.

Table 13.4. Adhesive Weight for Double Skin Core Repairs

Length (inches)

Width (inches) A \ B	2	4	6	8	10	12	14	16	18	20	22	24	26
2	17 4 .08	24 6 .12	32 8 .15	41 9 .18	48 11 .21	56 13 .24	64 15 .28	72 16 .31	80 18 .34	88 20 .37	95 22 .40	104 23 .43	111 26 .46
3		30 7 .14	40 9 .18	50 11 .22	59 14 .25	69 16 .29	79 18 .33	88 21 .36	98 23 .40	108 25 .44	118 28 .49	128 30 .51	138 32 .54
4		35 8 .16	46 11 .20	58 14 .25	70 16 .29	82 19 .33	94 21 .38	106 24 .41	118 26 .45	129 30 .50	140 33 .54	153 35 .58	164 38 .62
5			52 12 .23	66 16 .27	80 19 .32	95 21 .37	108 23 .40	122 28 .47	136 31 .53	150 34 .56	163 38 .61	177 41 .66	191 44 .71
6			58 14 .25	74 17 .31	90 21 .36	104 24 .41	122 28 .46	138 31 .51	152 36 .57	169 39 .62	176 42 .67	200 46 .72	216 50 .78
7				81 19 .34	110 22 .39	117 27 .48	135 31 .51	153 35 .57	170 39 .62	188 43 .66	205 45 .71	224 51 .79	241 55 .81
8				89 20 .36	108 25 .46	128 29 .49	148 34 .54	166 40 .61	187 43 .64	206 48 .74	226 52 .80	247 56 .86	266 61 .93
9					117 27 .46	139 32 .52	160 37 .59	182 42 .66	203 47 .73	225 52 .79	247 57 .84	269 61 .93	291 66 1.00
10					125 29 .49	149 34 .56	173 39 .63	196 45 .70	220 51 .78	244 56 .85	278 61 .93	291 67 1.00	314 73 1.08
11						158 37 .59	184 42 .67	209 49 .75	235 54 .83	261 60 .97	286 66 .99	312 72 1.06	337 78 1.15
12						168 38 .63	195 45 .71	222 52 .80	251 57 .88	278 64 .96	306 70 1.04	333 76 1.13	360 83 1.22
13							206 47 .75	236 54 .83	265 62 .92	295 67 1.02	325 74 1.11	354 81 1.20	383 88 1.28
14							217 50 .77	248 57 .88	280 64 .97	311 72 1.07	349 80 1.18	374 86 1.26	406 93 1.35
15								259 60 .92	293 68 1.02	327 75 1.12	361 82 1.22	393 91 1.31	427 99 1.42

Example:
217 - Weight of Base in Grams
50 - Weight of Hardner in Grams
.77 - Total Weight of Repair in Pounds



42 X 51

D145-10751-SPA

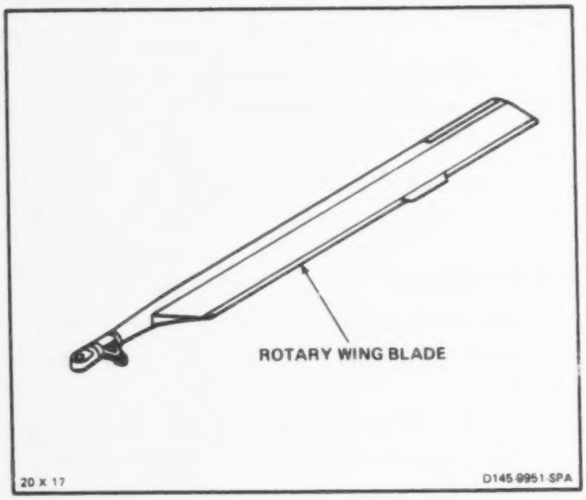
FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).

Adjust balance weights (Task 5-82.1)

END OF TASK

5-71 REPAIR TRAILING EDGE — MINOR DAMAGE 5-71



INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Heat Lamps
Trip Balance, NSN 6170-00-401-7195

Materials:

Abrasive Paper (E7 and E9)
Cloth (E120)
Acetone (E20)
Polyethylene Cup (E157)
Wood Spatula (E424)
Peel Ply (E270)
Teflon-Impregnated Fabric (E170)
Aluminum (E70)
Masking Tape (E388)
Adhesive (E43 or E47.1)
Curing Agent (E158.1)
Temperature Indicating Strips (E413)
Naphtha (E245)
Black Lacquer (E215)
Plastic Squeeze Bottle (E366)
Gloves (E186)

Parts:

Shim Stock, 0.005-Inch

Personnel Required:

Aircraft Structural Repairer
Inspector

References:

TM 55-1520-240-23P
Task 5-67.2

Equipment Condition:

Off Helicopter Task

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5-71 REPAIR TRAILING EDGE — MINOR DAMAGE (Continued) 5-71

NOTE

- Procedure is same to repair trailing edge minor damage on any rotary-wing blade.
- There is no limit to spanwise length of repair.

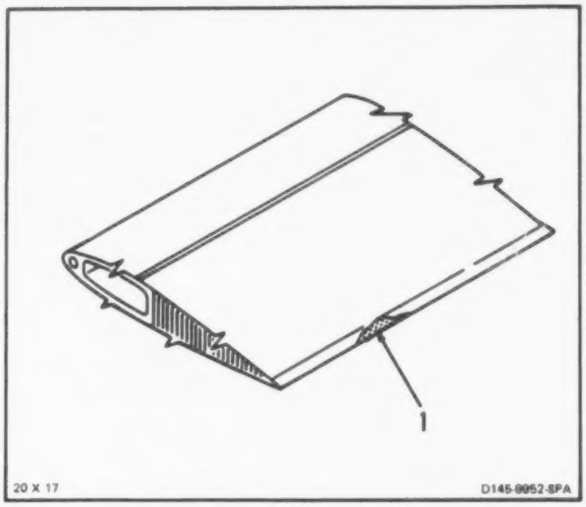
BLEND REPAIRS

1. **Blend cracks, nicks, or gouges less than 0.010 inch deep.** Use abrasive paper (E7).
2. Cracks, nicks, or gouges greater than 0.010 inch deep are repaired as fairing skin (Task 5-67.2).

WARNING

Lacquer (E215) is extremely flammable. It can be toxic. Keep away from heat, sparks, or open flames. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. Touch up repaired area (1). Use lacquer (E215). Wear gloves (E186).



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REPAIR DELAMINATIONS

4. Position blade with trailing edge (2) lower than leading edge (3).

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

5. Fill plastic squeeze bottle (E366) with acetone (E20).
6. **Flush delaminated area (4)** to wash out dirt. Use acetone (E20). Flush until acetone is free of contamination. Check that area is clean.

WARNING

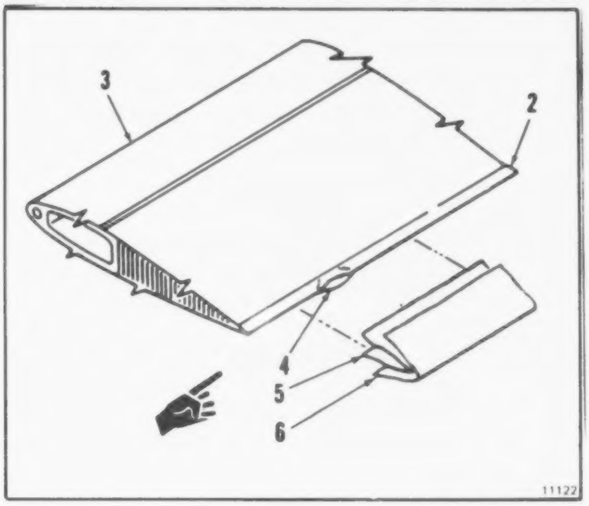
Adhesive (E47.1 or E43) is toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

7. **Prepare** small quantity of **adhesive** (E47.1 or E43) as follows:
   a. For adhesive (E47.1), weigh equal parts of adhesive (E47.1) and curing agent (E158.1). Use trip balance.
   b. For adhesive (E43), weigh 7 parts of gray hardener and 5 parts of white base. Use trip balance.
   c. Mix in polyethylene cup (E157). Use wood spatula (E424).

NOTE

Working life of adhesive (E47.1 or E43) is about 30 minutes .

8. **Work adhesive mix into delaminated area (4).** Use 0.005 inch shim stock.
9. **Bond repair area** as follows:
   a. Cover repair area. Use layer of peel ply (E270) (5) followed by layer of teflon-impregnated fabric (E170) (6). Cut both large enough to wrap around trailing edge and overlap repair 1 inch.



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b. Cut two pieces of wood or aluminum sheet (E70) (7). Position sheet on each side of repair. Clamp in place using moderate pressure.

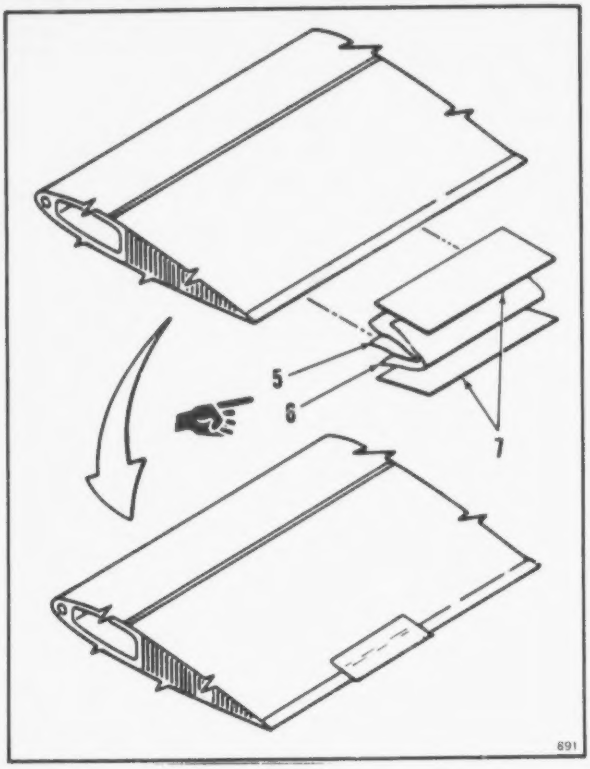
CAUTION

Do not heat blade surface over 160°F (71°C). Higher temperature can damage blade surface.

c. Cure adhesive 2 hours at 140°F to 160°F (60°C to 71°C). Use heat lamp. Monitor blade temperature. Use temperature indicating strips (E413).

NOTE

Adhesive may be cured for 24 hours at 70°F to 80°F (21°C to 27°C).



10. After repair is cured, remove wood or aluminum sheets (7), teflon-impregnated fabric (5).
11. **Blend repaired area** into blade surface. Use abrasive paper (E9).

WARNING

Naphtha (E245) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

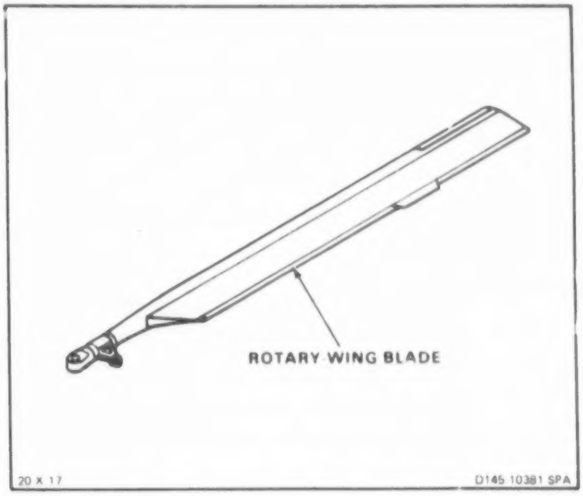
12. **Clean repaired area.** Use cloth (E120) damp with naphtha (E245). Wear gloves (E186). Wipe dry before naphtha evaporates.
13. **Touch up repaired area.** Use black lacquer (E215).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-72 TRAILING EDGE REPAIR — MAJOR DAMAGE 5-72



INITIAL SETUP

Applicable Configurations:
All

Tools:
Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Trailing Edge Bonding Fixture (T116)
Saber Saw
Sanding Block
Trip Balance NSN 6670-00-401-7195

Materials:
Masking Tape (E388)
Abrasive Paper (E7 and E9)
Acetone (E20)
Trailing Edge Material (E284) (Part of Blade Repair Kit 114RK651)
Fiberglass Laminate (E168) or (E168.1)
Gloves (E186)
Teflon Tape (E399)
Adhesive (E40, E41, E43, or E47.1)
Polyethylene Cup (E157)
Wood Spatula (E424)
Temperature Indicating Strips (E413)
Sealant (E336)
Polyvinyl Sheet (E284)
Curing Agent (E158.1)

Personnel Required:
Medium Helicopter Repairer (6)
Aircraft Structural Repairer
Inspector

Equipment Condition:
Off Helicopter Task

General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

WARNING

Adhesive (E40) is toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

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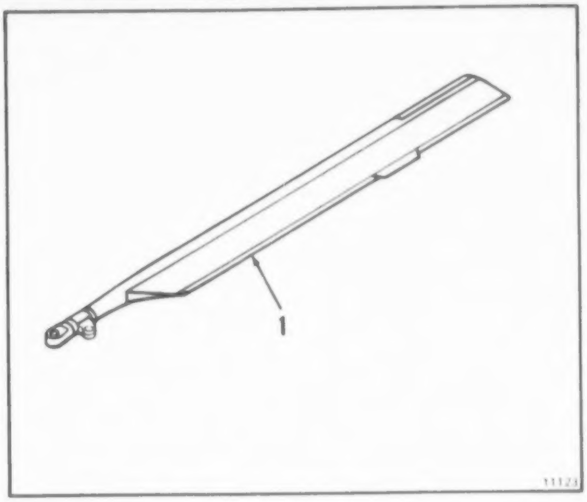
5-72 TRAILING EDGE REPAIR — MAJOR DAMAGE (Continued) 5-72

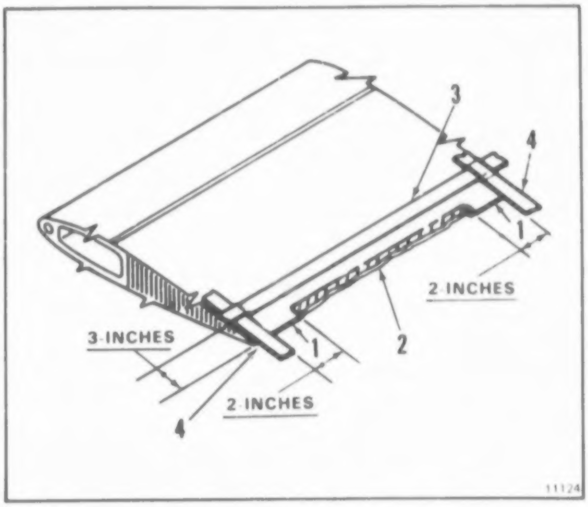
NOTE

There is no limit to the number of repairs that can be made. Minimum edge-to-edge distance between repairs shall be 6 inches.

1. **Check location and size of major damage to trailing edge (1).**
   a. Reparable damage of trailing edge (1) shall not exceed 1-1/4 inches chordwise. Spanwise damage is not limited.
   b. Damage greater than 1-1/4 inches chordwise requires rejection of the rotor blade.



2. **Mask damaged area (2)** as follows:
   a. Apply tape (E388) (3) spanwise 3 inches from trailing edge (1).
   b. Apply tape (E388) (4) chordwise 2 inches from edges of damaged area (2).
3. Remove finish from area inside tapes (E388) (3 and 4). Use abrasive paper (E7) and sanding block. Soften finish, if needed. Use acetone (E20). Remove tapes (3 and 4). Wear gloves (E186).

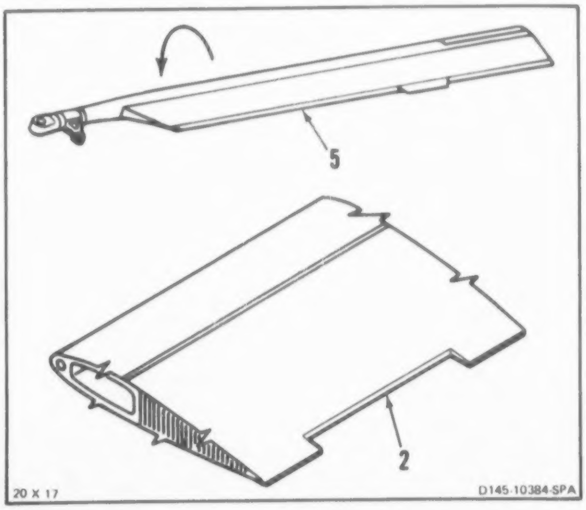


4. Have helpers turn blade (5) upside down.
5. **Draw rectangle outline around damaged area (2).** Do not exceed dimensions in step 1.

CAUTION

Do not cut forward of guide line around damaged area. Cutting chordwise farther than line will damage blade structure and require rejection of the blade.

6. Cut inside guide line to **remove damaged area (2).** Use a saber saw or hacksaw.



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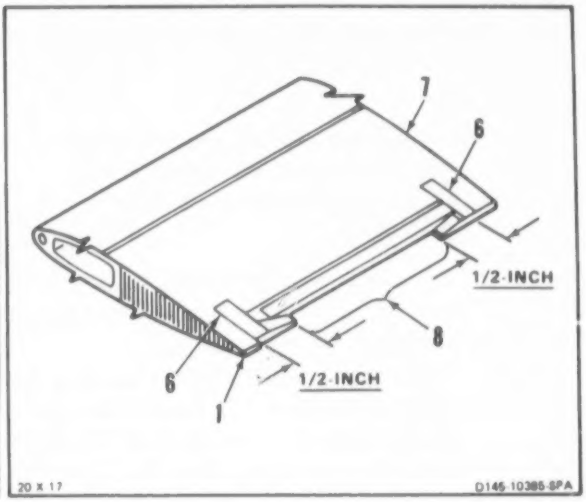
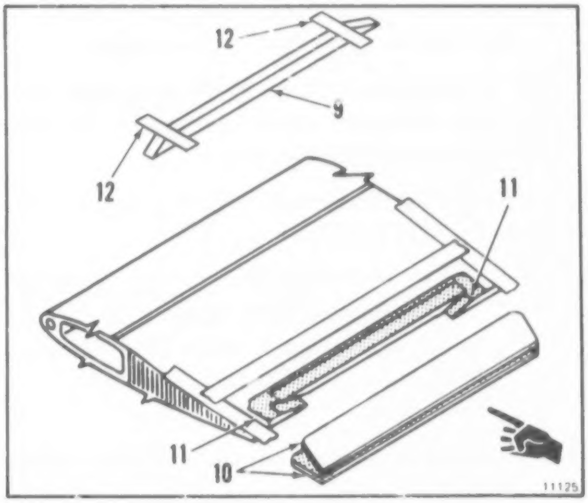


CAUTION

Do not cut bevel in upper surface of trailing edge. Strength of repair will be reduced.

7. **Bevel trailing edge (1)** as follows:
   a. Apply guide strips (6) of masking tape (E388) to blade underside (7) 1/2-inch outside ends of cutout (8).
   b. Bevel edge 1/2-inch toward tape (E388). Use file.
   c. Remove guide strips (6).



8. **Prepare insert (9) and doublers (10)** as follows:
   a. Cut insert (9) from trailing edge material (E284). Make insert long enough to cover bevels (11).
   b. Tape guide strips (12) on insert (9) 1/2-inch from ends. Use masking tape (E388). Bevel insert to guide strips. Use file.
   c. Remove guide strips (12).
   d. Cut two doublers of fiberglass laminate (E168) or (E168.1) (10) 1/2-inch wider chordwise, and 2 inches longer spanwise than insert (9).
   e. Check fit of insert (9). Check that doublers (10) overlap insert by 1/2-inch chordwise and 2 inches spanwise.
   f. If fiberglass laminate (E168.1) is used, remove peel ply covering from surfaces of doublers (10).

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5-72 TRAILING EDGE REPAIR — MAJOR DAMAGE (Continued) 5-72

9. **Prepare surfaces for bonding** as follows:

CAUTION

Surface glaze must be removed from insert and doublers. Poor bond will result if glaze is not removed.

   a. Sand both sides of doublers (10) and insert (9) lightly to remove surface glaze. Use abrasive paper (E9).
   b. Wear gloves (E186). Clean bonding surfaces of doublers (10), insert (9), and trailing edge (1). Use cloth (E120) damp with acetone (E20). Wipe dry with clean cloth before acetone evaporates.

10. **Position doublers (10)** on clean surface with lower doubler extending past upper doublers by 1/8-inch at trailing edges.

10.1. If fiberglass laminate (E168.1) is used, ensure that outer edges of doublers (10) are curled towards the blade.

11. **Hinge doublers (10)** at trailing edges. Use teflon tape (E399).

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41), (E43), or (E47.1) only when adhesive (E40) is not available.

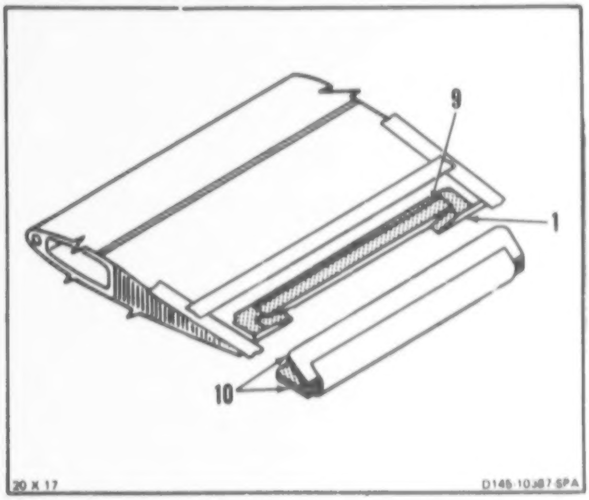
12. **Mix prepackaged adhesive (E40).** Follow instructions in kit.

NOTE

Correct adhesive weight is required to obtain good bond.

13. If adhesive (E40) is not available, prepare alternate adhesive as follows:

   a. For adhesive (E41), weigh 100 parts of resin and 23 parts of hardener. Mix until color is uniform. Use polyethylene cup (E157) and wood spatula (E424).
   b. For adhesive (E43), weigh 7 parts of gray hardener and 5 parts of white base. Mix until color is uniform. Use polyethylene cup (E157) and wood spatula (E424).



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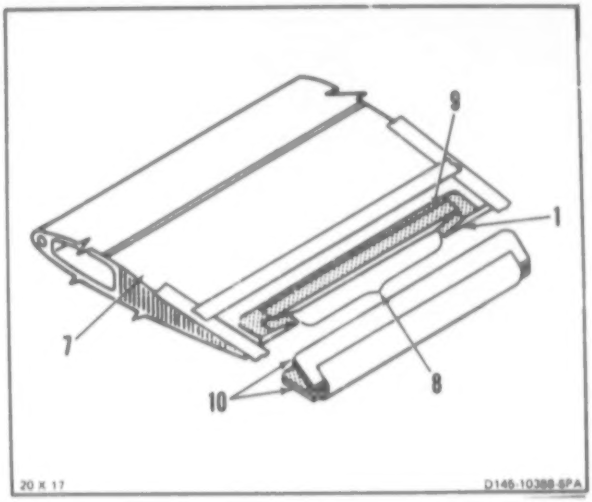
5-72 TRAILING EDGE REPAIR — MAJOR DAMAGE (Continued) 5-72

c. For adhesive (E47.1), weigh equal parts of adhesive (E47.1) and curing agent (E158.1). Mix until color is uniform. Use polyethylene cup (E157) and wood spatula (E424).



14. **Apply adhesive (E40), (E41), (E43), or (E47.1)** as follows:

NOTE

Working life of adhesive is about 30 minutes.

a. Coat insert (9). Use a short-bristle brush. Position insert in cutout (8).

b. Coat bonding surfaces of doublers (10).

c. Position hinged doublers (10) over insert (9). Center doublers over repair and align with trailing edge (1).

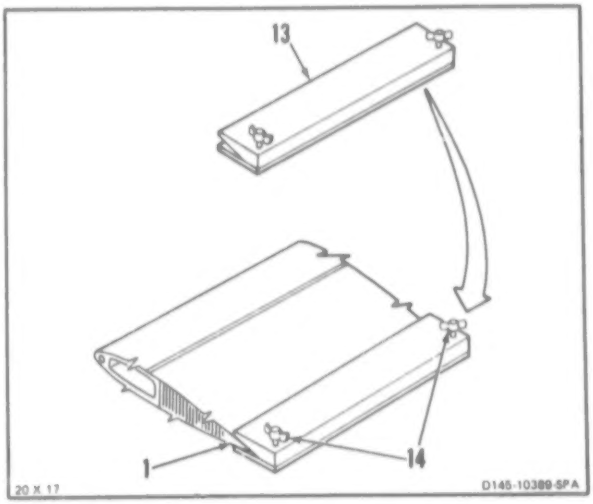
d. Secure doublers (10). Use teflon tape (E399). Cover entire surface of doublers. Overlap skin of blade underside (7) at least 3 inches in all directions.

15. **Install trailing edge bonding fixture (T116) (13)** as follows:

a. Cover facing surfaces of fixture (T116) (13). Use teflon tape (E399).

b. Install fixture (T116) (13) over trailing edge (1). Center fixture over repair, and seat firmly against trailing edge.

c. Tighten wing nuts (14) on fixture (T116) (13). Be sure fixture or repair have not moved.



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CAUTION

Do not allow temperature to exceed 160°F (71°C) at blade surface. Damage to fiberglass blade can result.

16. **Cure adhesive** 2 hours at 140°F to 160°F (60°C to 71°C) . Use heat lamp. Monitor temperature with temperature indicating strips (E413).

CAUTION

Adhesive cure time increases rapidly with lower temperatures. Do not count cure time periods when temperature is less than 65°F (18°C) .

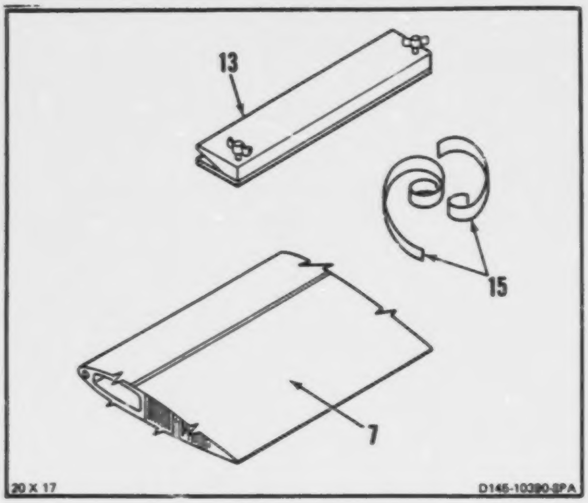
NOTE

Serviceable cure will be achieved in 24 hours at 70°F to 80°F (21°C to 27°C) . Fixture (T116) may be removed after 12 hours .

17. **Remove fixture (T116) (13) and tape (E399) (15).** Check for squeezeout or voids.
18. If squeezeout fairing is not satisfactory, fair doubler to surface of blade underside (7). Use sealant (E336). Allow 6 hours for curing.

FOLLOW-ON MAINTENANCE:

Refinish blade (Task 5-82).



END OF TASK

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5-72.1 REPLACE BLADE FAIRING TIP SECTION 5-72.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer Tool Kit, NSN 5180-00-323-4876
Sanding Block
Pencil Compass
Straightedge
Hacksaw or
Power Coping Saw
Vacuum Cleaner
Vacuum Pump
Protective Clothing
Respirator
Trip Balance, NSN 6670-00-401-7195
Heat Lamp

Materials:

Wire Mesh (E453)
Acetone (E20)
Gloves (E186)
Abrasive Paper (E6, E7, E9)
Teflon Tape (E399)
Cloth (E120)
Adhesive (E40), or
Adhesive (E41)
Polyethylene Cup (E157)
Wood Spatula (E424)
Peel Ply (E270)
Teflon-Impregnated Fabric (E170)
Rubber Pad (E318)
Glass Cloth (E132)
Sealing Tape (E396)
Polyvinyl Sheet (E284)
Temperature Indicating Strips (E413)
Fiberglass Laminate (E168 or E168.1)

Personnel Required:

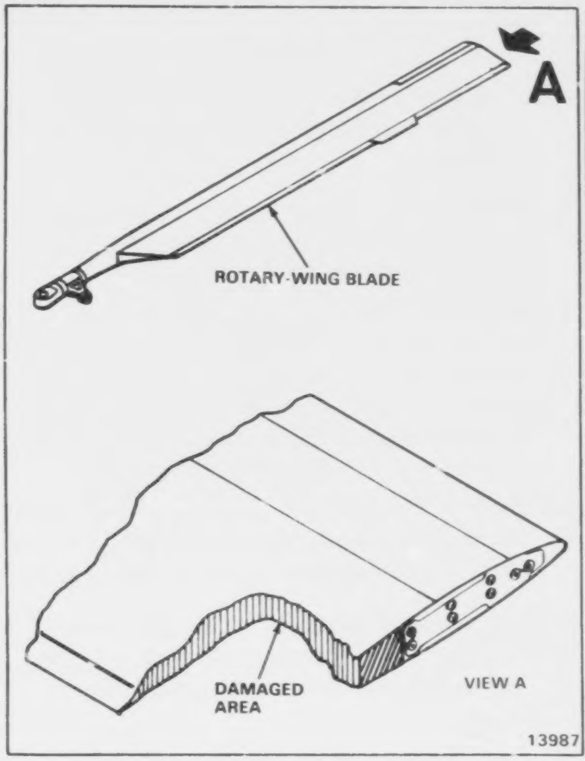
Aircraft Structural Repairer
Inspector

References:

Task 5-76
Task 5-77

Equipment Condition:

Off Helicopter Task



General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Adhesive (E40 or E41) is extremely flammable. It is volatile. It forms harmful vapors and explosive peroxides. Keep away from heat, sparks, or open flame. Avoid inhaling. Use only with adequate ventilation.

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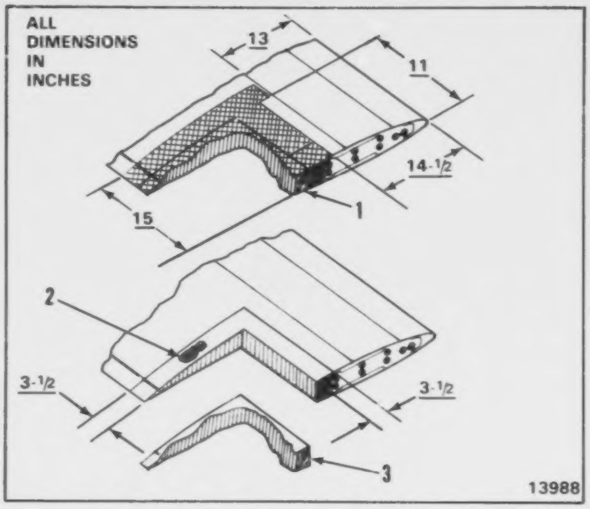
5-72.1 REPLACE BLADE FAIRING TIP SECTION (Continued) 5-72.1

NOTE

Section outline can be square, rectangular, or triangular to suit shape of damage.

1. **Mark outline** of damaged section of blade (1) to be cut away on both sides of blade. Observe limits shown.
2. **Remove finish** 3-1/2 inches outside of marked-off area on both sides of blade. Use sanding block and abrasive paper (E6). Use acetone (E20) if needed to soften finish. Complete finish removal with abrasive paper (E7). Wear gloves (E186). Do not sand through wire mesh (2).
3. **Remove marked-off section (3)** of blade. Use a hacksaw or power coping saw.



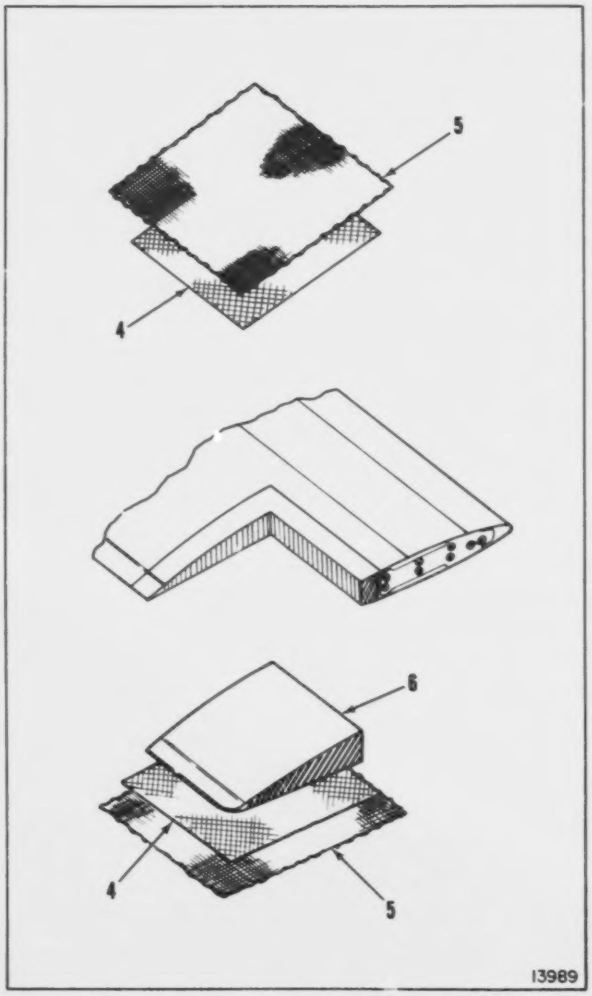
4. **Cut two doublers (4)** of fiberglass laminate (E168 or E168.1), each piece 1-1/2 inches larger than the cutout section. Record weight.
5. **Cut two pieces (5)** of wire mesh (E453), each 1 inch larger than doublers (4). Record weight.
6. **Cut a section of blade fairing (6)** equal to the removed section.
7. If doublers (4) were cut from laminate (E168.1), **remove peel ply** from both surfaces of each piece **Lightly sand both sides of doublers, replacement section (6), and wire mesh (5).** Use abrasive paper (E9).

NOTE

Adhesive will not adhere to fiberglass unless glaze has been removed.

8. **Clean doublers (4), wire mesh (5), and replacement section (6)** with acetone (E20). Wear gloves (E186). Wipe dry with clean cloth (E120).

INSPECT



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5-72.1 REPLACE BLADE FAIRING TIP SECTION (Continued) 5-72.1

APPLY ADHESIVE

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41) only if prepackaged kit is not available.

9. **Mix tube of adhesive (E40).** Follow instructions on kit.

CAUTION

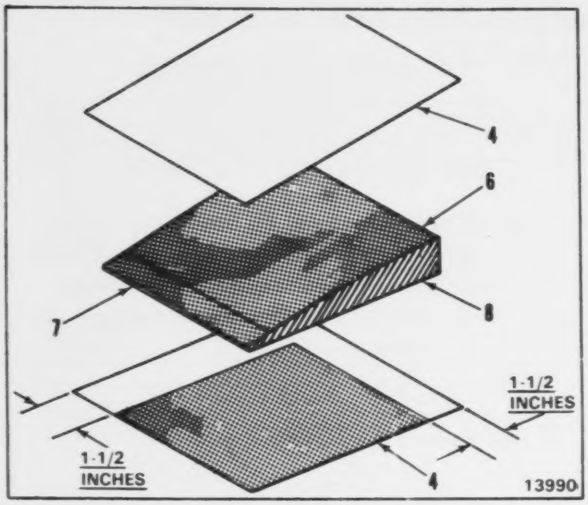
Weigh and mix adhesive and resin accurately to produce acceptable bond.

10. If adhesive (E40) is not available, prepare adhesive (E41). Weigh 100 parts of resin, and 23 parts of hardener. Mix in polyethylene cup (E157) until color is uniform. Use wood spatula (E424). Wear gloves (E186).

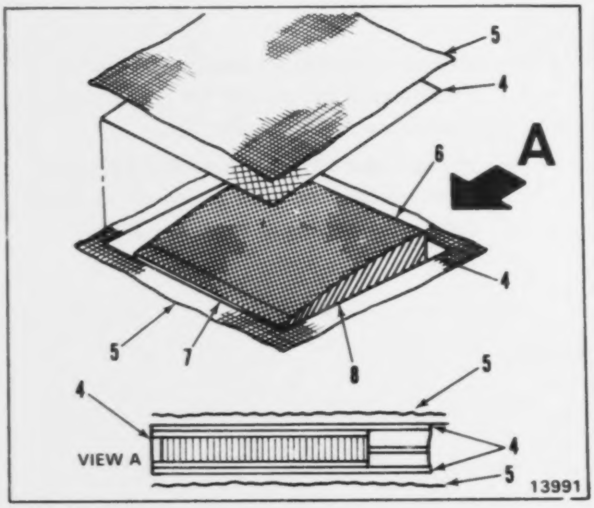
NOTE

Working life of adhesive is 30 minutes.

11. **Align** trailing edge (7) and tip (8) of **replacement section (6) with outside edges of doublers (4).** Check that doublers overlap section 1-1/2 inches in each direction. Mark outline of section on each doubler.
12. **Apply adhesive (E40 or E41)** to bottom of replacement section (6) and marked side of doublers (4) within marked outline. Record weight of adhesive used.



13. **Position section (6)** within outline **on one doubler (4).** Press firmly together.
14. **Position top doubler (4) on replacement section (6).** Press firmly together.
15. **Apply** a thin coat of **adhesive to outside surface of both doublers (4).**
16. Align mesh (5) with trailing edge (7) and tip (8) of section (6) over doublers (4). **Set mesh in adhesive** on doublers.



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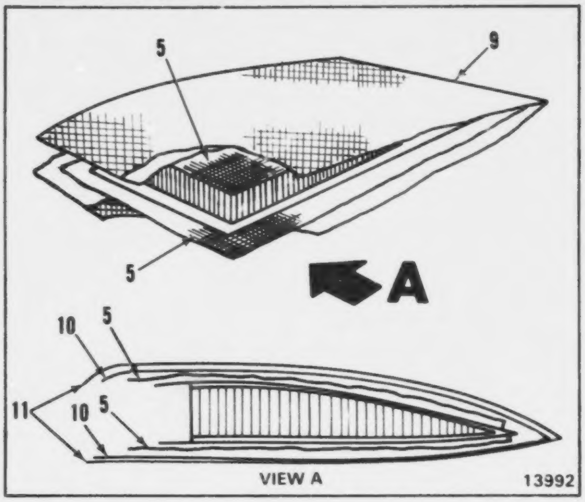
BOND REPLACEMENT ASSEMBLY

17. **Bond assembly (9)** as follows:

NOTE

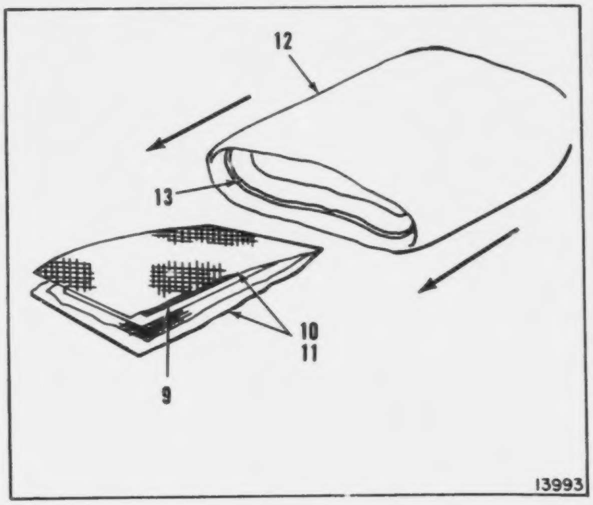
Wear gloves (E186) for all steps.

a. **Cover mesh (5)** on both sides of assembly with a layer of **peel ply (E270) (10) and** a layer of **fiberglass cloth (E130) (11).** Make layers large enough to overlap mesh 1 inch.



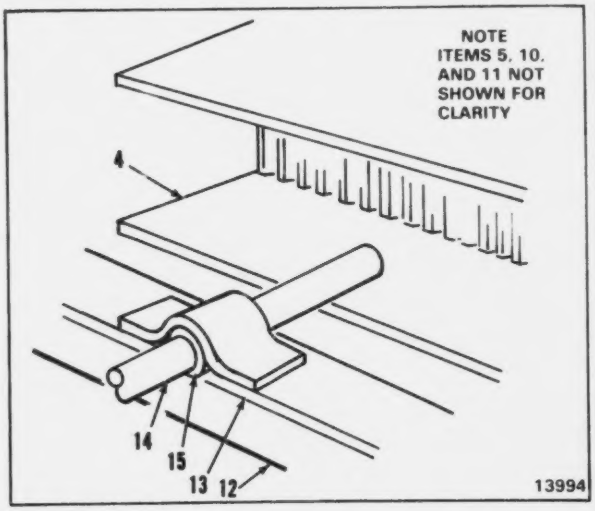
b. **Make an airtight bag (12)** large enough to hold assembly (9). Use polyvinyl sheet (E284) and tape (E396). **Place a border (13) of tape (E396)** around the inside surface of the open end of the bag.

c. **Slide bag (12) over assembly (9).** Be careful not to dislodge layers (10 and 11).



d. Attach tube (14) to vacuum pump hose. **Position tube** on bottom doubler (4) inside open end of bag (12).

e. **Wrap tube (14) in tape (E396) (15)** where it crosses tape border (13). Press tube onto border to make an airtight seal.


NOTE
ITEMS 5, 10, AND 11 NOT SHOWN FOR CLARITY

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5-72.1 REPLACE BLADE FAIRING TIP SECTION (Continued) 5-72.1

f. **Press open end of bag (12) closed** over tube (14). Use extra tape (E396) as needed to obtain an airtight seal.

NOTE

Distortion of wire mesh (5) by force of vacuum is acceptable.

g. Start vacuum pump. Check for leaks. Reposition bag (12) or add tape (E396) as needed.

h. Maintain 20 inches Hg vacuum through adhesive cure.

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass blade can occur.

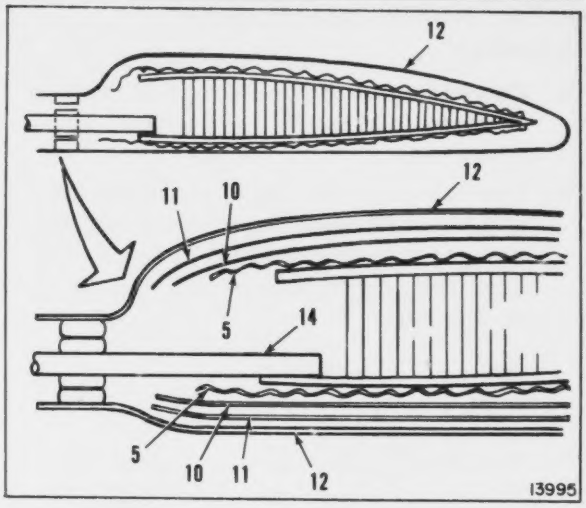
i. Cure adhesive at 150° to 160°F (66° to 71°C) 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70° to 80°F (21° to 27°C) in 24 hours. Vacuum may be removed after 12 hours.

j. Turn off vacuum pump.

k. Remove bag (12) and hose (14). Remove fiberglass cloth (11) and peel ply (10).



INSPECT

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5-72.1 REPLACE BLADE FAIRING TIP SECTION (Continued) 5-72.1

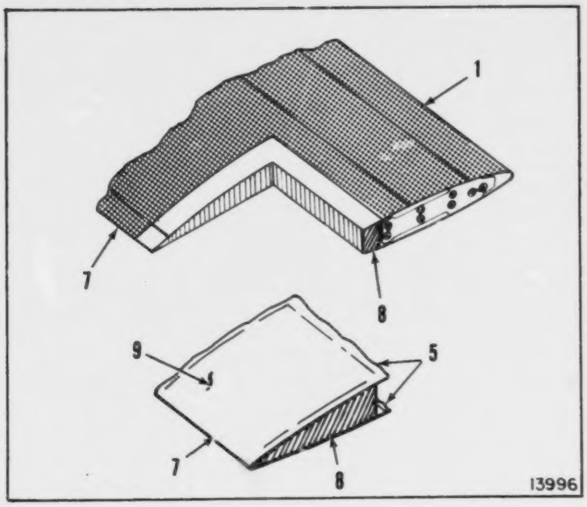
INSTALL FAIRING REPLACEMENT ASSEMBLY

18. **Clean bonded assembly (9) and mating surfaces** of blade (1). Use a vacuum cleaner in core areas.
19. Wear gloves (E186). **Wipe assembly (9) and blade (1) with clean cloths (E120) damp with acetone (E20).** Wipe dry with clean cloths before acetone dries. Do not remove gloves.

NOTE

Wear gloves for remainder of task.

20. **Fit assembly (9)** in position on blade (1). Mark outline of wire mesh (5) on both sides of blade (1). Remove assembly.
21. Prepare adhesive mixture as in steps 9 and 10.
22. **Coat mating surfaces,** including exposed core, of blade (1) and assembly (9) with adhesive. Record weight of adhesive used.
23. **Fit assembly (9)** firmly into blade (1). Align surfaces at trailing edge (7) and tip (8).



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5-72.1 REPLACE BLADE FAIRING TIP SECTION (Continued) 5-72.1

BOND REPLACEMENT ASSEMBLY

24. **Bond assembly (9)** to blade (1) as follows:

    a. Cover assembly (9) on each side of blade (1) with layer of peel ply (E270) (15) and layer of teflon-impregnated fabric (E170) (16). Make layers large enough to overlap mesh (5) 1 inch.

    b. Cover fabric (16). Use thick rubber pad (E318) (17).

    c. Cover repair areas. Use fiberglass cloth (E130) (18). Cut cloth large enough to cover rubber pad (E318) (17). Overlap cloth over trailing edge onto opposite patch.

    d. Apply a band of tape (E396) (19) around blade (1), inboard of layer of fiberglass cloth (18). Keep tape clear of cloth.

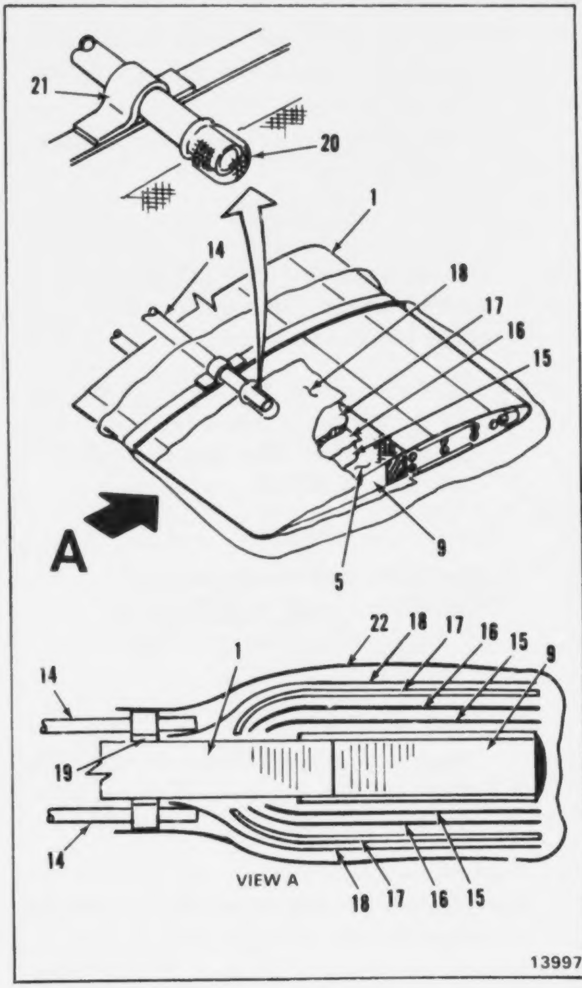
    e. Attach two tubes (14) to vacuum pump hose.

    f. Wrap end of tubes (14) in two layers of fiberglass cloth (E130) (20). Hold cloth to tubes with tape (E388).

    g. Position tubes (14) on cloth (18) on top and bottom of blade (1). Wrap tubes with tape (E396) (21) where they cross tape band (19). Press tubes onto tape band to make airtight seal.

    h. Make an airtight bag (22) large enough to cover tip of blade (1) past tape band (19). Use polyvinyl sheet (E284) and tape (E396).

    i. Slip bag (22) over tip of blade (1). Press bag smoothly onto tape (19) to make an airtight seal.



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5-72.1 REPLACE BLADE FAIRING TIP SECTION (Continued) 5-72.1

j. Start vacuum pump. Check for leaks. Reposition bag (22) or add tape (E396) (19) as needed.

k. Maintain 20 inches Hg vacuum through adhesive cure.

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass blade can occur.

l. Cure adhesive at 140° to 160°F (60° to 71°C) for 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70° to 80°F (21° to 27°C) in 24 hours. Vacuum may be removed after 12 hours.

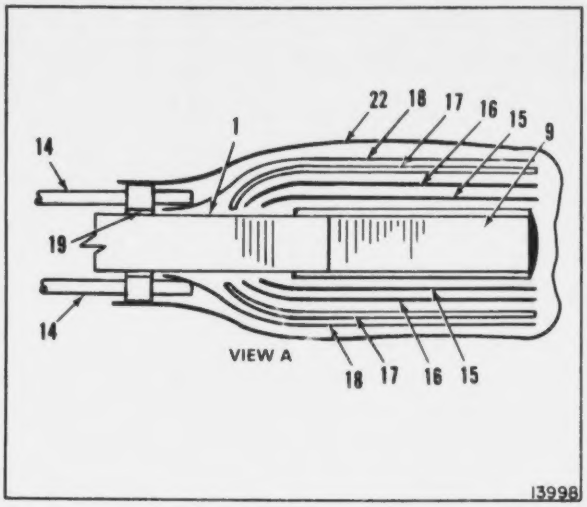
m. Turn off vacuum pump.

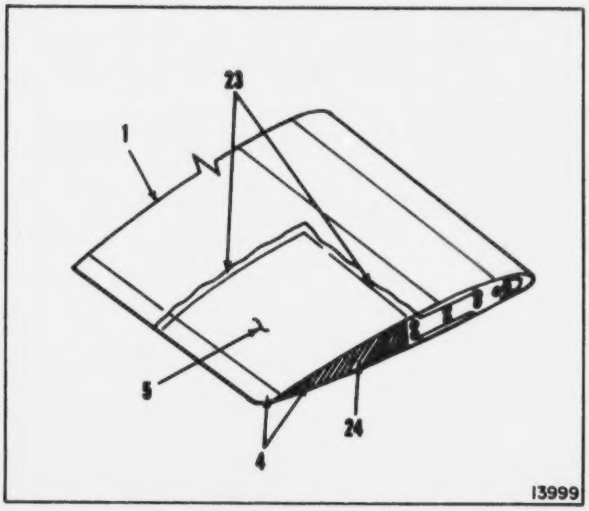
n. Remove bag (22), tubes (14), tape (19), fiberglass (18), rubber (17), fabric (16), and peel ply (15).

25. If squeezeout fairing (23) is not satisfactory, **fair doubler (4) and mesh (5) to surface of blade (1)** with adhesive (E40 or E41). Prepare adhesive mixture as in steps 9 and 10.

26. **Refinish** tip seal area (24) (Task 5-76 or 5-77).

27. **Add recorded weights** of doublers (4), mesh (5) and adhesive used.





FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).

Adjust balance weights (Task 5-82.1).

END OF TASK

5-73 REMOVE BLADE TIP COVER 5-73

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692

Materials:

Paper Tags (E264)

Personnel Required:

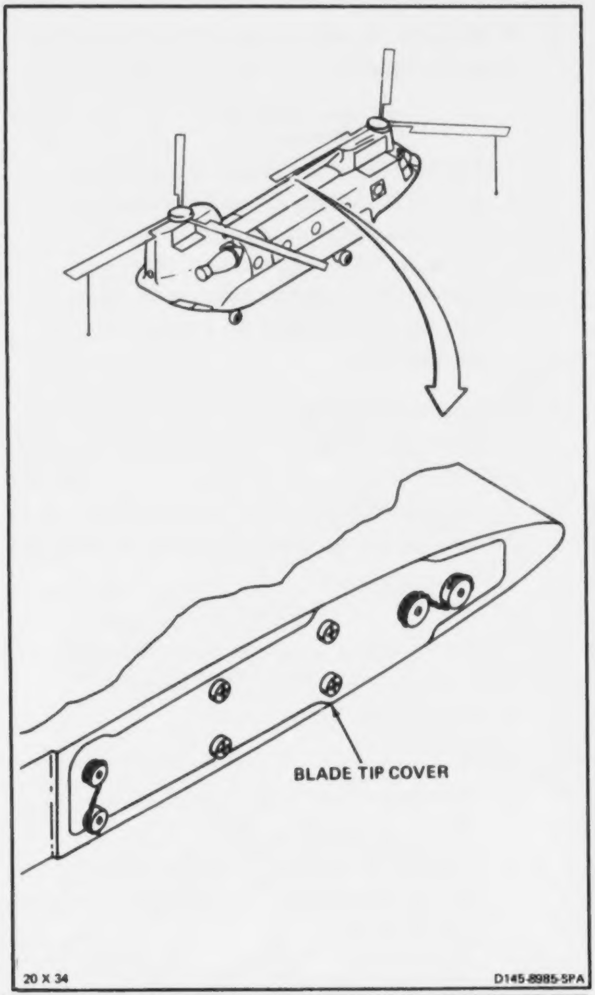
Medium Helicopter Repairer

References:

Task 5-82.1

Equipment Condition:

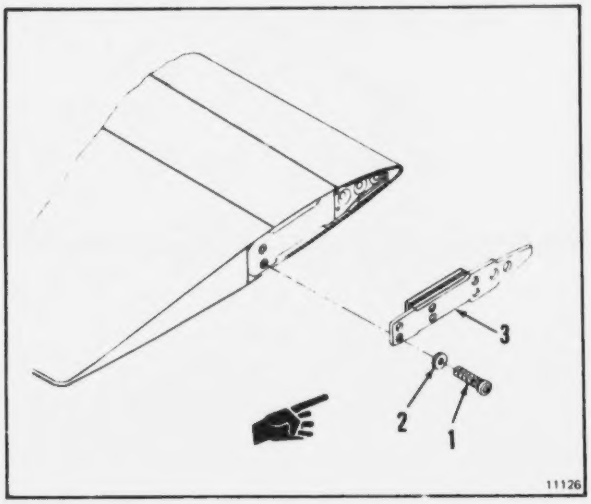
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Blade Positioned Over Tunnel, One Forward and One Aft Blade Tied Down (Task 1-26)
Work Platforms Open as Required (Task 2-2)



NOTE

Procedure is same to remove any blade tip cover. Forward blade tip cover is shown here.

1. Remove lockwire. Remove four screws (1) and washers (2). **Remove tip cover (3).**



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5-73 REMOVE BLADE TIP COVER (Continued) 5-73

2. If tip cover (3) will be replaced, remove four nuts (4), washers (5), and bolts (6).

WARNING

Do not lose weights. Same number of weights must be installed on replacement cover. Wrong number of weights can increase vibration levels resulting in damage to equipment and injury to personnel.

3. **Remove weights (7)** from cover (3). Tag weights with blade serial number. Use paper tags (E264).
4. If a wedge-shaped rubber insert is found laying against the tip cover, proceed as follows:

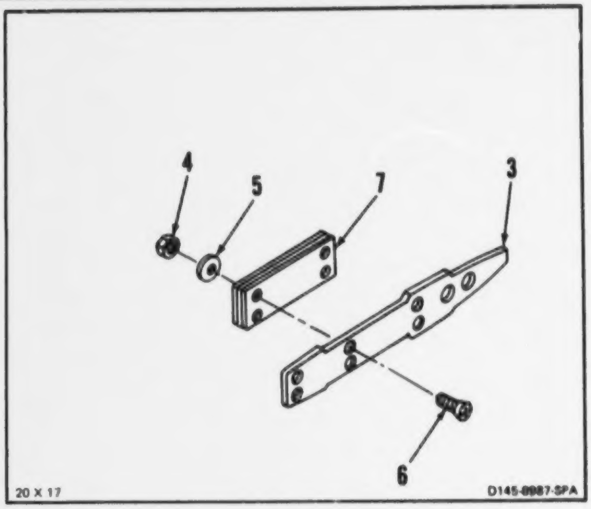
NOTE

The wedge is a tooling insert installed on the inboard side of the forward weight tube during blade manufacture.

   a. Remove insert and weigh it. It weighs about 14 ounces.
   b. Add weight equal to insert weight to center tube of forward weight fitting (Task 5-82.1).

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-74 INSTALL BLADE TIP COVER 5-74

INITIAL SETUP

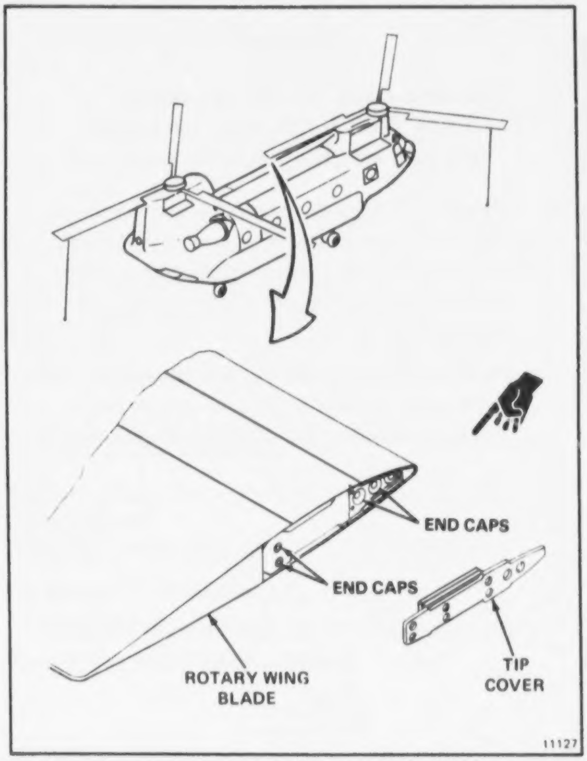
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Torque Wrench, 30 to 150 Inch-Pounds
Torque Wrench, 100 to 750 Inch-Pounds

Materials:
Lockwire (E233)

Personnel Required:
Medium Helicopter Repairer
Inspector

References:
TM 55-1520-240-23P
Task 5-82.1



WARNING

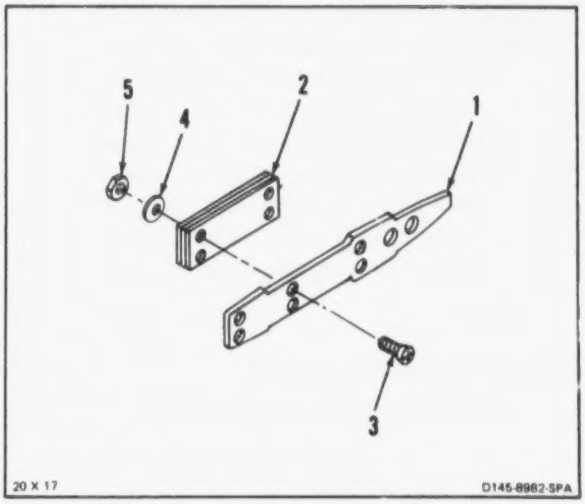
Do not install wrong number of weights on tip cover. Vibration levels can be increased, resulting in damage to equipment and injury to personnel.

CAUTION

Do not use power tools to install tip covers. Damage can result.

NOTE

Procedure is same to install any blade tip cover. Forward blade tip cover is shown here.



1. If tip cover (1) is a replacement, remove tag from weights (2). **Position weights on cover. Install four bolts (3),** washers (4), and nuts (5). **Torque nuts to 60 inch-pounds above run-on torque.**

INSPECT

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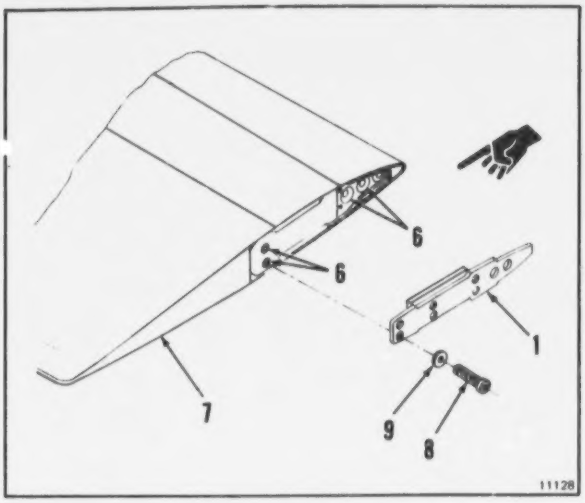
5-74 INSTALL BLADE TIP COVER (Continued) 5-74

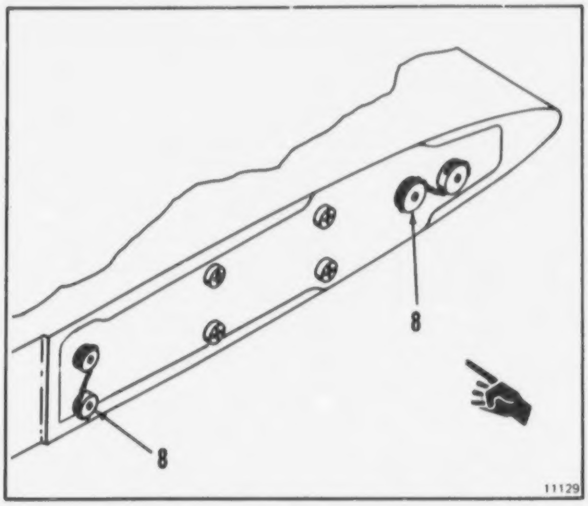
CAUTION

If end caps (6) are recessed more than 0.06 inch, tip cover (1) will not be properly retained.

2. Check end caps (6) are flush with end of weight tubes. If any end cap is recessed more than 0.06 inch, replace blade balance weight spacers. (Task 5-82.1, steps 6 through 9.)
3. **Position tip cover (1) on blade (7). Install four screws (8)** and washers (9). **Torque screws to 175 inch-pounds .**



4. Lockwire screws (8). Use lockwire (E233).



FOLLOW-ON MAINTENANCE:

Close work platforms (Task 2-2).

END OF TASK

5-75 REPAIR ROTARY-WING BLADE TRIM TAB 5-75

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit,
NSN 5180-00-323-4876
Stencils, 1/2-Inch
Scissors
Trip Balance, NSN 6670-00-4-1-7195
Heat Lamps

Materials:

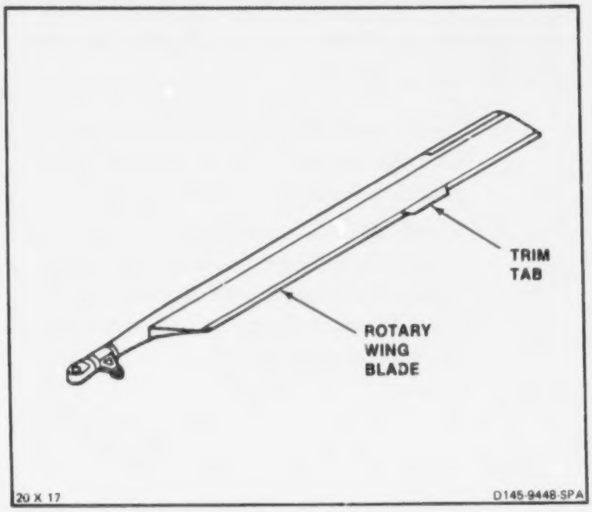
Glass Cloth (E130)
Adhesive (E43 or E47.1)
Abrasive Paper (E6 and E9)
Cloth (E120)
Aliphatic Napntha (E245)
Acetone (E20)
Fiberglass Laminate (E168 or E168.1)
Masking Tape (E325)
Scrim Cloth (E325)
Peel Ply (E270)
Teflon Impregnated Fabric (E170)
Aluminum Sheet (E70 or E71)
Temperature Indicating Strips (E413)
Hypodermic Syringe (E380)
Squeeze Bottle (E366)
Epoxy Primer (E293)
Polyethylene Cup (E157)
Thinner (E418)
Yellow Lacquer (E225)
Wood Spatula (E424)
Gloves (E186)
Curing Agent (E158.1)

Parts:

Shim, 0.005 Inch

Personnel Required:

Aircraft Structure Repairer
Inspector



References:

TM 55-1520-240-23P

Equipment Condition:

Off Helicopter Task

General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

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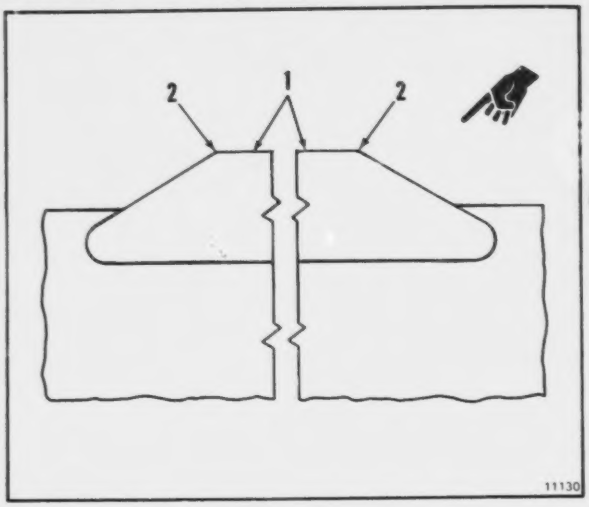
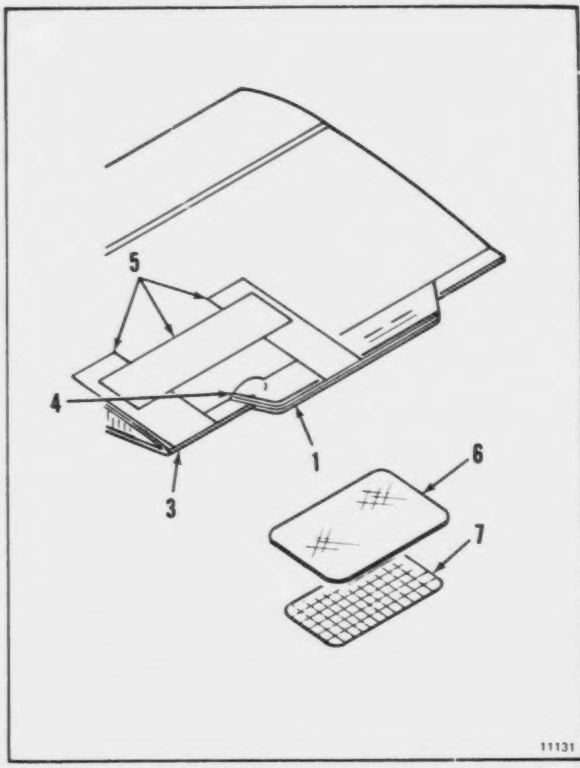
5-75 REPAIR ROTARY-WING BLADE TRIM TAB (Continued) 5-75

1. **Blend out nicks and scratches on trim tab (1)** as follows:
   a. Blend nicks on edge (2) of trim tab (1). Use file parallel to edge. Radius at corners (2) must be at least 1/2 inch .
   b. Blend nicks or scratches on surface of trim tab (1). Blend to width 20 times depth of damage. Use abrasive paper (E9). Maximum depth of rework shall not exceed 0.005 inch.



2. **Repair bond voids** as follows:
   a. Tap suspect void areas with edge of coin to find inboard void line.
   b. **Remove finish from surface of blade (3)** 1 1/2 inches around void area (4). Use abrasive paper (E6).
   c. **Remove finish from trim tab (1)** where it overlaps blade surface 1 1/2 inches beyond bond void (4). Use abrasive paper (E9).
   d. **Mask around sanded area.** Use tape (E388) (5).
   e. **Flush bond void (4)** with acetone (E20) until only clear acetone flows. Use a hypodermic syringe (E380) or squeeze bottle (E366). Wear gloves.
   f. **Wipe sanded area** with cloth (E120) damp with acetone (E20). Wipe dry with a clean cloth before acetone evaporates.
   g. **Cut a doubler (6)** of fiberglass laminate (E168 or E168.1) 2 inches by 3 inches. Radius corners 1/4 inch. Remove protective film from both sides of doubler. Lightly sand both sides of doubler to remove glaze.
   h. **Cut a piece of scrim cloth (E325) (7)** 1 3/4 inches by 2 3/4 inches.



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5-75 REPAIR ROTARY-WING BLADE TRIM TAB (Continued) 5-75

i. Center doubler (6) over trim tab (1) at bonded void (4). Mark outline on blade surface. Use a pencil.

j. **Wipe surfaces of doubler (6)** with cloth (E120) damp with acetone (E20). Wipe dry before acetone evaporates. Set doubler (6) and scrim cloth (7) aside for bonding.

k. **Mix a small amount of adhesive (E43 or E47.1)** as follows:

WARNING

Adhesive (E43 or E47.1) is toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

(1) If adhesive (E43) is used, mix 5 parts of white base and 7 parts of gray hardener. Use trip balance. Stir in polyethylene cup (E157) with wood spatula (E424) until color is uniform. Use gloves (E186).

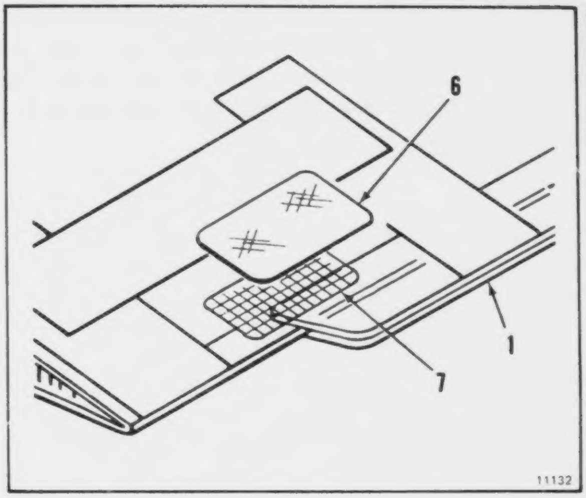
(2) If adhesive (E47.1) is used, mix equal parts of adhesive (E47.1) and curing agent (E158.1). Use trip balance. Stir in polyethylene cup (E157) with wood spatula E(424) until color is uniform. Use gloves (E186).

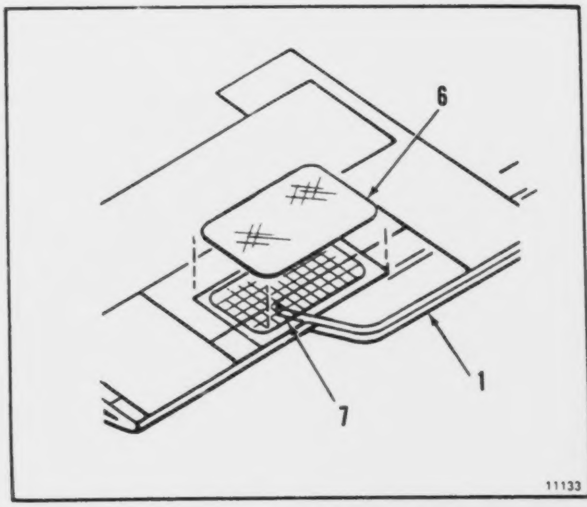
NOTE

Working life of adhesive (E43 or E47.1) is about 30 minutes.

l. Work adhesive (E43 or E47.1) into the bond void. Use a piece of clean 0.005 inch shim stock. Apply a coat of adhesive to the outlined area.

m. Position scrim cloth (7) on the adhesive. Coat doubler (6) with adhesive (E43 or E47.1) and position it on the outlined area. When properly positioned, press doubler onto scrim cloth.





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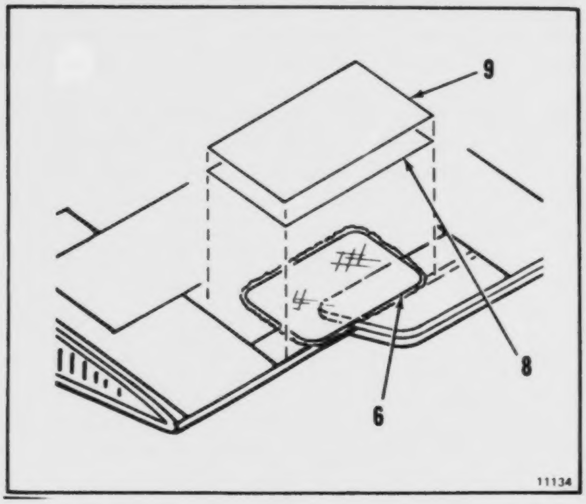
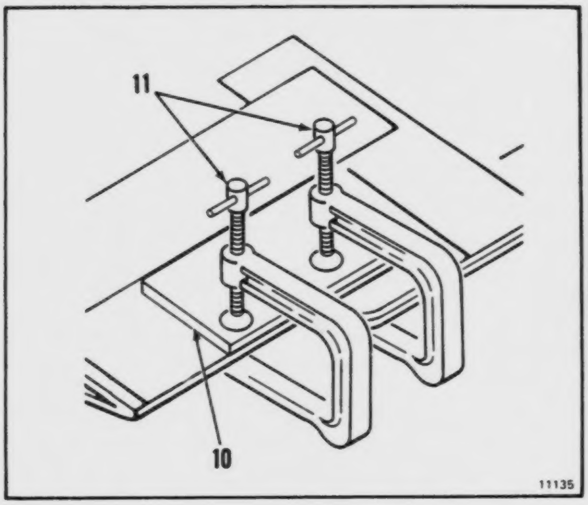
n. Cover the repair with a layer of peel ply (8) and teflon impregnated fabric (9). Make each layer large enough to overlap the doubler (6) and bond void about 1 inch.



o. Place a block of wood or aluminum sheet (10) over the repair. Apply moderate pressure. Use C-clamps (11).



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CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.

p. Cure adhesive at 150°F to 160°F (66°C to 71°C) for 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

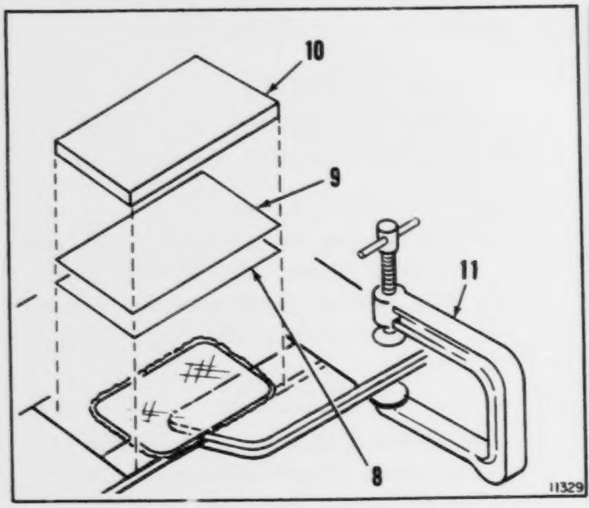
CAUTION

Curing time increases rapidly as temperature decreases. Adhesive (E43 or E47.1) will not cure below 60°F (15°C). Do not count as cure time any period when temperature is below 70°F (21°C).

NOTE

If heat lamp is not available, a serviceable cure can be achieved at 70°F to 80°F (21°C to 27°C) in 24 hours.

q. When cure is complete remove clamps (11), aluminum sheet (10), teflon impregnated fabric (9), and peel ply (8). Fair the repair as required. Use abrasive paper (E9).



INSPECT

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3. Refinish the repair area as follows:

NOTE

Refinishing is required only when existing finish has been marred by the repair.

a. If finish was marred during repair, lightLy sand the area. Use abrasive paper (E9). Remove sanding residue. Use a clean dry cloth (E120).

WARNING

Naphtha (E245) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

CAUTION

Do not soak blade with solvent. Use damp cloths only. Use only aliphatic naphtha TT-N-95 (E245).

b. Wipe the surface. Use clean cloths (E120) damp with naphtha (E245). Wipe dry before naphtha evaporates. use clean dry cloth (E120).

WARNING

Epoxy primer (E292) is flammable and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from heat or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

c. If bare metal is exposed, mix epoxy primer (E292) according to manufacturer's instructions.

d. Apply primer (E292) in a thin mist coat. Allow to dry at least 1 hour.

WARNING

Lacquer (E215) is extremely flammable. It can be toxic. Keep away from heat, sparks, or open flames. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Thinner (E418) is flammable and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from heat or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

e. Thin lacquer (E215) with thinner (E418) in accordance with manufacturer's instructions.

f. Apply 2 coats of lacquer (E215) to the repair area. Allow at least 45 minutes between coats.

g. If necessary restencil trim tab angle (X° UP or X°DOWN) and DO NOT BEND. Use 1/2 inch high letters. Use lacquer (E225) thinned with thinner (E418).

FOLLOW-ON MAINTENANCE:

Check trim tab angle (Task 5-75.1).

END OF TASK

5-75.1 CHECK AND ADJUST ROTOR BLADE TRIM TAB ANGLE 5-75.1

INITIAL SETUP

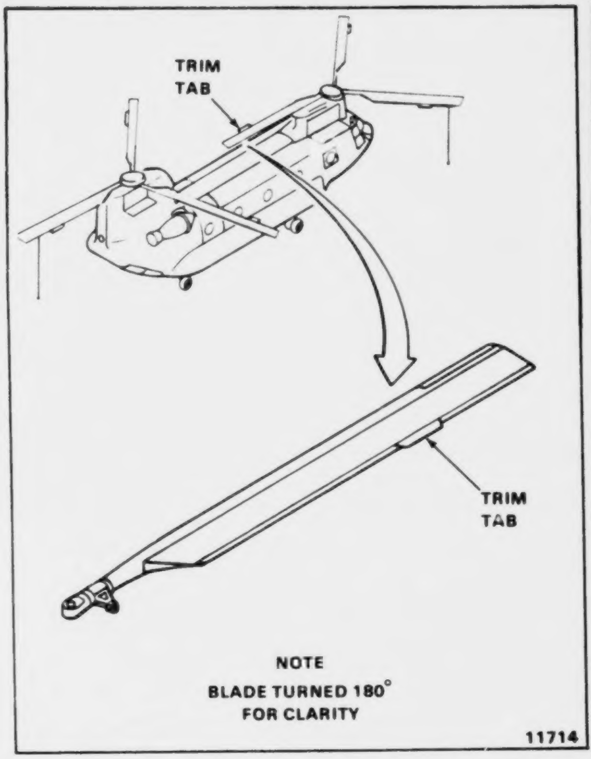
Applicable Configurations:
All

Tools:
Trim Tab Bending and Indicating, Fixture 145G1019-29

Materials:
None

Personnel Required:
Medium Helicopter Repairer
Inspector

Equipment Condition:
Battery Disconnected (Task 1-39)
Electric Power Off
Hydraulic Power Off
Blade Positioned Over Tunnel, One Forward and One Aft Blade Tied Down (Task 1-26)



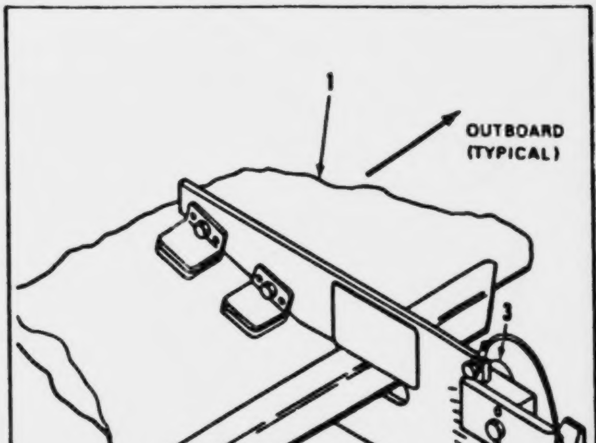
NOTE
BLADE TURNED 180°
FOR CLARITY

NOTE

Trim tab bending and indicating fixture 145G1019-29 contains the following assemblies:

145G1019-32 Angle Indicator Assy
145G1019-30 Cusp Clamp Assy
145G1019-31 Trim Tab Clamp Assy

1. **Install angle indicator** assembly (1) on blade fairing about four inches inboard of the outboard end of trim tab (2).
2. Loosen thumb screw (3), clamping trim tab checking assembly (4) on angle indicator (1).



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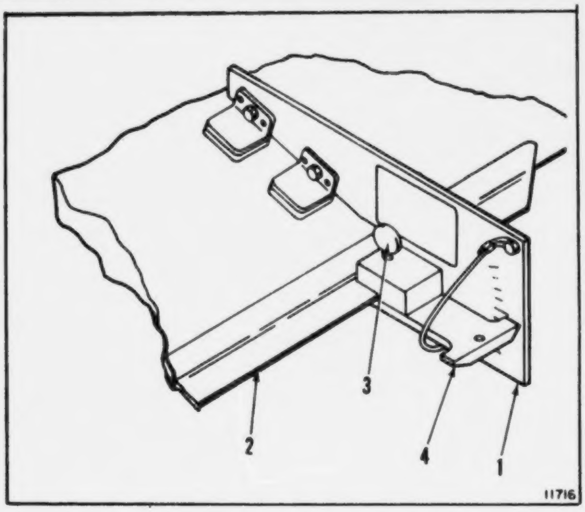
5-75.1 CHECK AND ADJUST ROTOR BLADE TRIM TAB ANGLE (Continued) 5-75.1

3. **Install checking assembly (4)** on trim tab (2). Check that UPPER AIRFOIL marking is facing up. Make sure checking assembly is fully seated on trim tab. Tighten thumb screw (3).
4. **Read the angle** indicated by checking assembly (4) at scale on angle indicator (1). Compare angle with the angle value stenciled on trim tab (2).

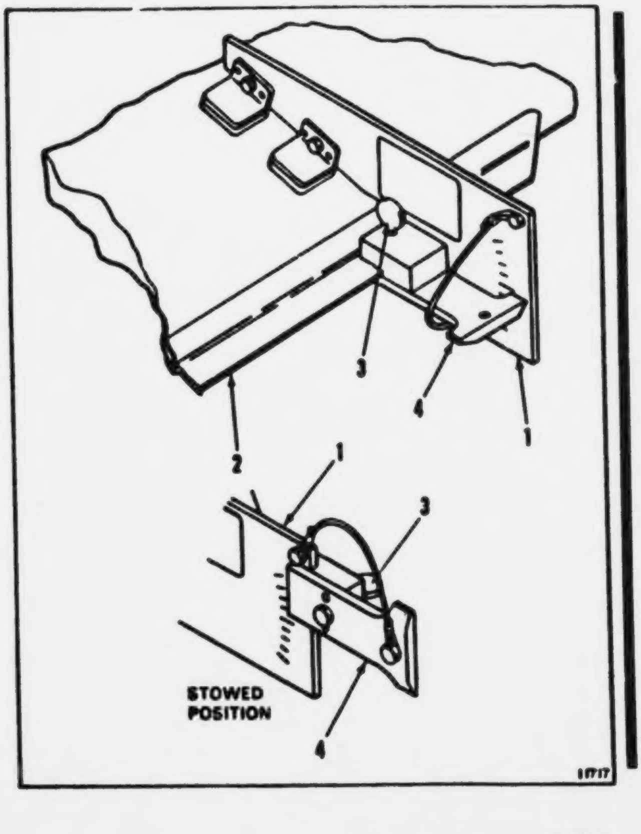
NOTE

Measurement of trim tab angle shall always be made at the inboard end of trim tab.

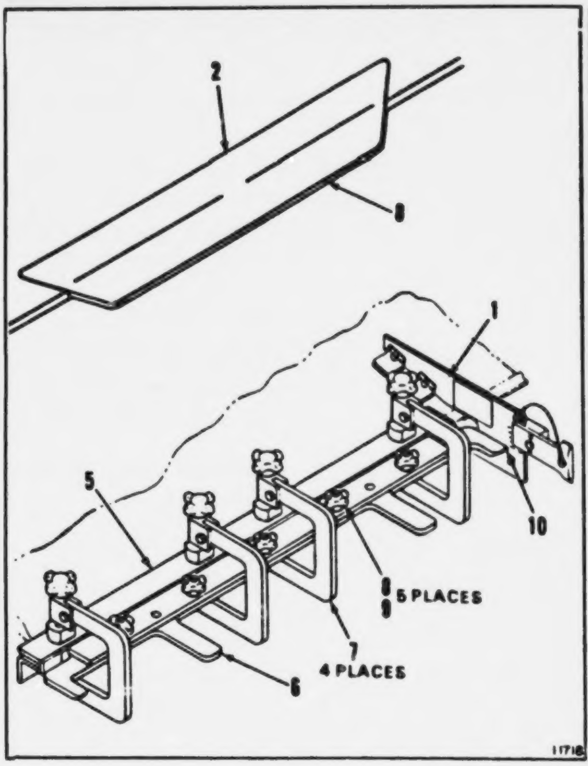
5. If measured angle is the same as angle stenciled on trim tab (2), go to step 7.



6. If measured angle is not the same as angle stenciled on trim tab (2), proceed as follows:
   a. Loosen thumb screw (3) and remove checking assembly (4) from trim tab (2). Stow checking assembly on angle indicator (1). Tighten thumb screw.
   b. Remove angle indicator assembly (1) from blade.



5-75.1 CHECK AND ADJUST ROTOR BLADE TRIM TAB ANGLE (Continued) 5-75.1



NOTE

Cusp clamp and trim tab clamp must be installed as a unit.

c. If trim tab clamp (6) is not nested in cusp clamp (5), open C-clamps (7) and position trim tab clamp inside jaws of C-clamps.

d. **Install cusp clamp (5) and trim tab clamp (6)** over trim tab (2). Check that UPPER AIRFOIL markings are facing up.

e. Ensure that cusp clamp (5) is firmly seated against blade trailing edge. Tighten C-clamps (7).

f. Ensure that trim tab clamp (6) is centered and fully seated against trim tab trailing edge (8). Tighten hand wheels (9).

g. Install angle indicator assembly (1) on outboard end of trim tab clamp (6). Scale of angle indicator shall be next to pointer. (10)

NOTE

To prevent tab springback, bend trim tab about 20 degrees in the required direction then back to the required angle.

h. **Using handles on trim tab clamp (6), bend trim tab (2)** to the angle stenciled on tab. Read new bend angle of trim tab on pointer (10) on scale of angle indicator (1).

i. Loosen clamps (7) and (8). Remove cusp clamp (5) and trim tab clamp (6) from rotor blade.

7. Remove angle indicator assembly (1).

FOLLOW-ON MAINTENANCE:

Remove tiedown lines from blades (Task 1-26).

END OF TASK

5-76 INBOARD RIB CLOSURE AND TIP SEAL MINOR REPAIR 5-76

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Rubber Spatula
Scissors
Sanding Block
Trip Balance, NSN 6670-00-401-7195
Vacuum Pump
Heat Lamps

Materials:

Acetone (E20)
Gloves (E186)
Cloth (E120)
Sealant (E336)
Teflon Tape (E399)
Glass Cloth (E130)
Abrasive Paper (E7) and (E9)
Adhesive (E20)
Fiberglass Cloth (E132)
Polyethylene Cup (E157)
Teflon Impregnated Fabric (E170)
Methyl-Ethyl-Ketone (E244)
Peel Ply (E270)
Polyvinyl Sheet (E284)
Tape, Masking (E388)
Sealing Tape (E396)
Wood Spatula (E424)
Temperature Indicating Strips (E413)

Personnel Required:

Aircraft Structure Repairer
Inspector

References:

Task 5-73
Task 5-74

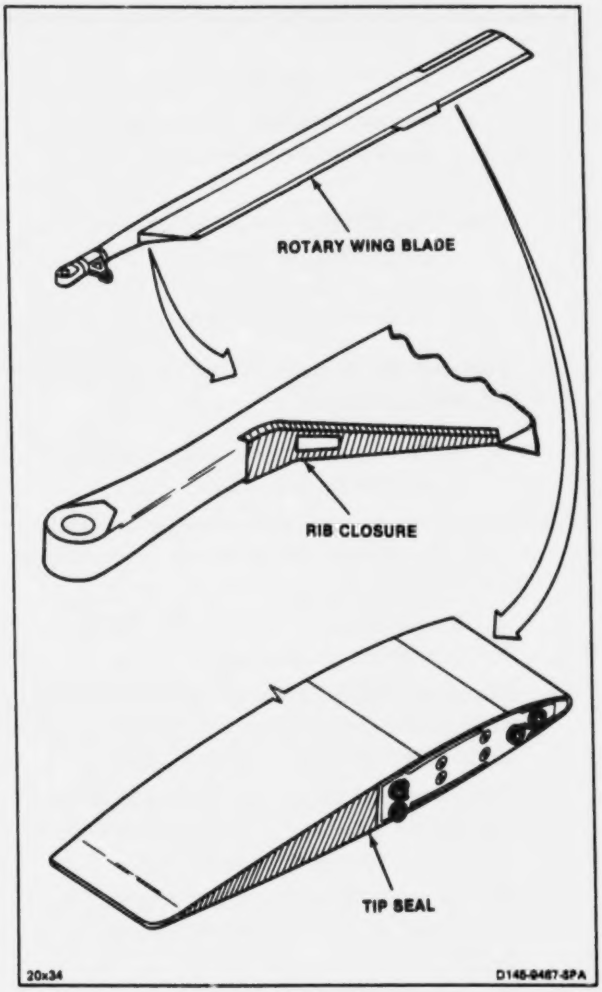
Equipment Condition:

Off Helicopter Task

General Safety Instructions:

WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

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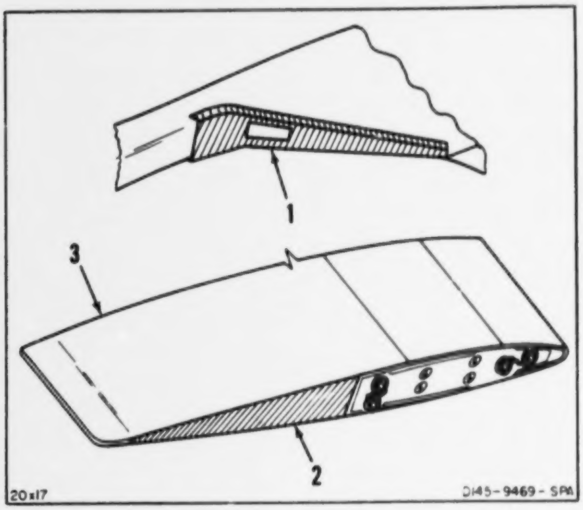
5-76 INBOARD RIB CLOSURE AND TIP SEAL MINOR REPAIR (Continued) 5-76

NOTE

- If more than half of material is missing or damaged, go to task 5-77.
- Procedure is similar for inboard rib closure and tip seal minor repair on any rotary-wing blade. Differences are noted in text.

1. **Prepare rib closure (1) or tip seal (2) for repairs** as follows:
   a. Remove loose material from damaged area. Use pocket knife.
   b. On tip seal (2) only, remove fiberglass from around damaged area. Use pocket knife.
   c. On rib closure (1) only, trim rubber to feather edge. Use pocket knife.
2. **Clean damaged area of rib closure (1) or tip seal (2).** Use cloth (E120) damp with acetone (E20). Wear gloves (E186).
3. **Fill damaged area.** Use sealant (E336). Fair sealant to shape of surfaces around repair area. Use rubber spatula.
4. **On tip seal (2) only, cover repair.** Use glass cloth (E130) wetted with sealant (E336).
5. **Cover repaired area. Use Teflon tape (E346).** Pull tape tightly over repair. Secure tape firmly to blade (3). Be sure tape overlaps repair no less than 1-inch.
6. **Cure sealant** 6 hours at 70°F to 80°F (21°C to 27°C).
7. Remove tape. Check that repair is secure, and there are no voids.

INSPECT



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5-76 INBOARD RIB CLOSURE AND TIP SEAL MINOR REPAIR (Continued) 5-76

8. If inboard rib closure (1) or tip seal (2) are not covered with fiberglass, prepare the area as follows:

   a. **On tip seal (2), remove the tip cover** (Task 5-73).

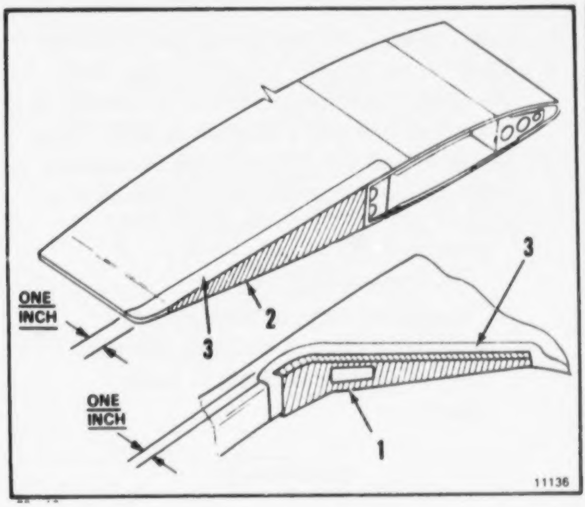
   b. **Remove finish** from rib closure (1) or tip seal (2) and from surface of blade (3) for 1 inch in all directions. Use cloth (E120) damp with acetone (E20). Wear gloves (E186).

   c. **Remove surface glaze** from rib closure (1) or tip seal (2) and exposed blade skin (3). Use abrasive paper (E7).

WARNING

Methyl-ethyl-ketone (E244) is flammable. It can irritate skin and cause burns. Use only with adequate ventilation, away from heat or open flame. Avoid contact with skin, eyes,or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

   d. **Wipe exposed area** with clean cloth damp with methyl-ethyl-ketone (E244). Wear gloves (E186).



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5-76 INBOARD RIB CLOSURE AND TIP SEAL MINOR REPAIR (Continued) 5-76

9. **Cut a piece of fiberglass cloth (E130)** (5) or (4) as shown, 1/2 inch larger in all directions than the tip seal or rib closure. If more than one piece of cloth is used, allow pieces to overlap 1/2 inch. On rib closure, make cutout (6) in cloth to expose data plate.

NOTE

Fiberglass cloth will fit with fewer wrinkles if cloth is cut with fibers running at 45 degree angle to blade chord.

WARNING

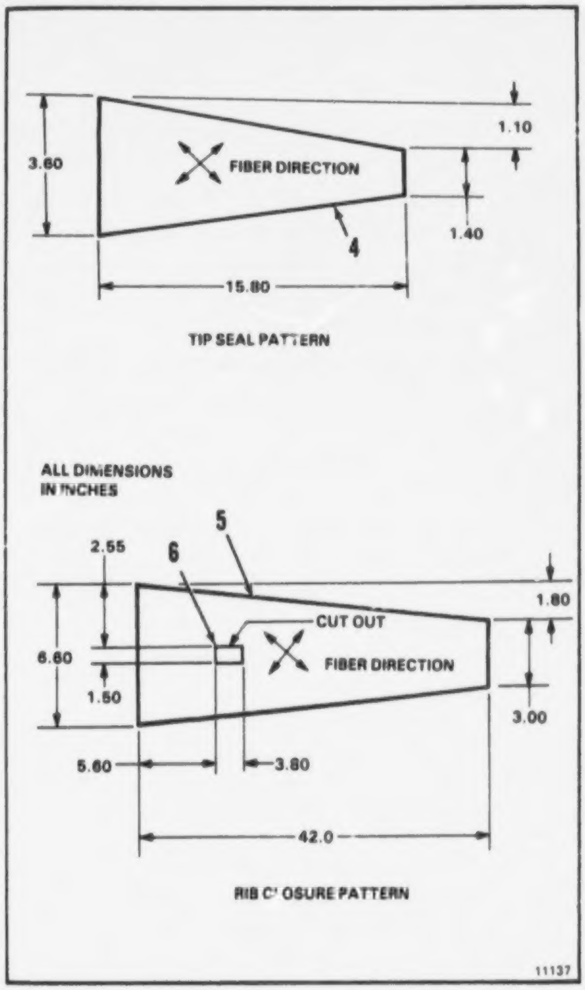
Adhesive (E43) is toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

10. **Mix adhesive (E43)** as follows:
    a. For tip seal, weigh 42 grams of gray hardener and 30 grams of white base.
    b. For closure rib, weigh 119 grams of gray hardener and 85 grams of white base.
    c. Mix hardener and base in polyethylene cup (E157). Use wood spatula (E424). Wear gloves (E186).

NOTE

Working life of adhesive is about 30 minutes.

11. Weigh adhesive and fiberglass cloth covering. Record the weight.


1.10
3.60
FIBER DIRECTION
1.40
4
15.80
TIP SEAL PATTERN
ALL DIMENSIONS IN INCHES
5
2.55
6
1.80
CUT OUT
6.60
FIBER DIRECTION
1.50
3.00
5.60
3.80
42.0
RIB CLOSURE PATTERN
11137

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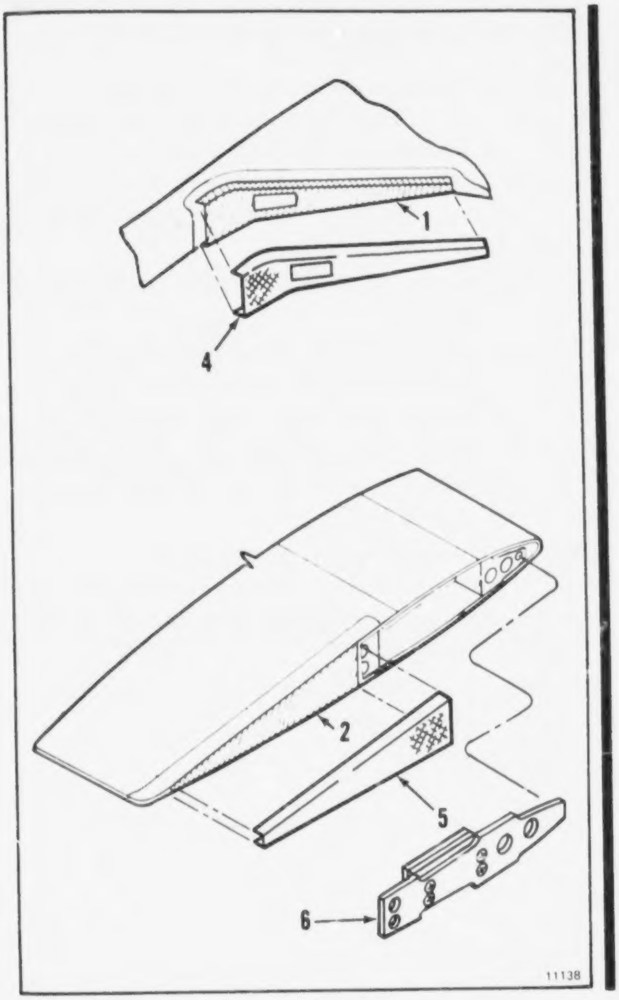
5-76 INBOARD RIB CLOSURE AND TIP SEAL MINOR REPAIR (Continued) 5-76

12. **Apply a coat of adhesive** to rib closure (1) or tip seal (2) and the surrounding blade surface. Use a stiff brush with bristles cut short. Wear gloves (E186).
13. **Position glass cloth cover (4) or (5)** over closure rib (1) or tip seal (2). Dab with brush to remove wrinkles.
14. Apply additional adhesive to saturate cloth.
15. For tip seal (2) only, apply teflon tape (E399) to aft end of tip cover (6).
16. Temporarily install tip cover (6) (Task 5-74).



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5-76 INBOARD RIB CLOSURE AND TIP SEAL MINOR REPAIR (Continued) 5-76

17. **Vacuum bag the repair** as follows:

    a. Cover repair with a sheet of peel ply (E270) (6) and a sheet of teflon impregnated fabric (E170) (7). Cut material large enough to overlap repair 1 inch in all directions. Hold in place with masking tape (E388).

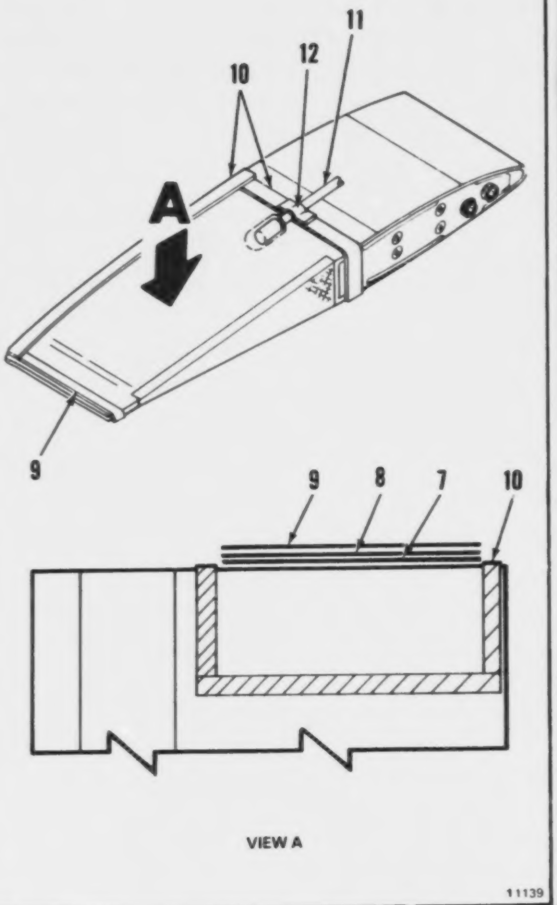
    b. Cover repair with fiberglass cloth (E132) (8).

    c. Surround cloth (8) with sealing tape (E396) (9). Keep tape clear of cloth.

    d. Attach tube (10) to vacuum pump hose. Wrap two layers of cloth (E132) around tube. Secure cloth to tube with masking tape (E388).

    e. Position tube (10) on cloth (E132). Wrap tube with sealing tape (E396) (11) where tube crosses sealing tape (9) already applied.

    f. Press tube (10) onto tape (9) to make airtight seal.



5-76 INBOARD RIB CLOSURE AND TIP SEAL MINOR REPAIR (Continued) 5-76

g. Cut a piece of polyvinyl sheet (E284) large enough to overlap sealing tape (9) in all directions.

h. Press polyvinyl sheet (12) onto sealing tape (9) to make airtight seal. Smooth out wrinkles.

i. Start vacuum pump. Check for leaks. Reposition polyvinyl sheet or add sealing tape (E396) as needed.

18. Maintain 20 inches Hg during adhesive cure time.

CAUTION

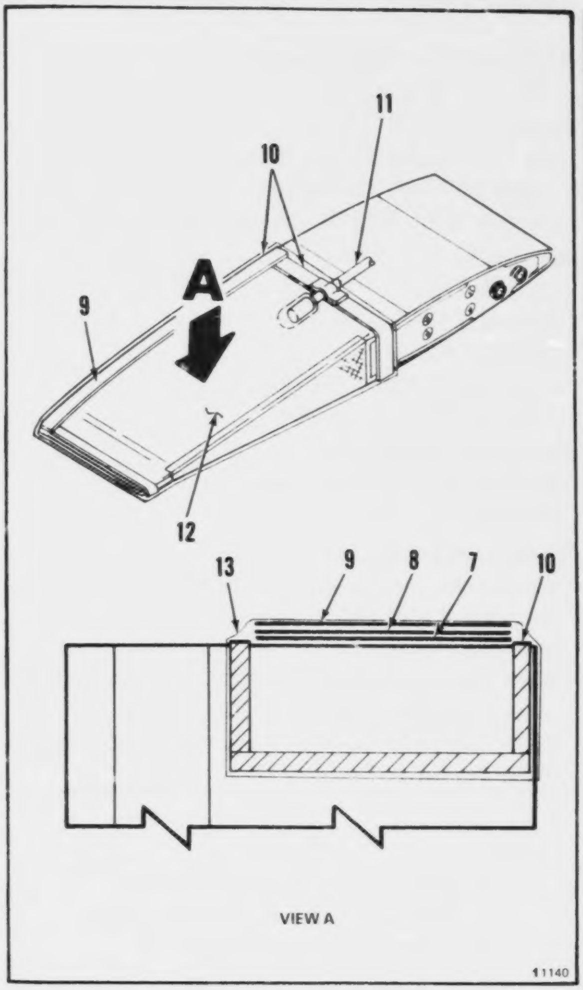
Do not exceed 180°F (82°C) at blade surface. Damage to fiberglass can occur.

19. **Cure adhesive** at 140° to 160°F (60°C to 71°C) for 2 hours. Use heat lamp. Monitor temperature. use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70° to 80°F (21°C to 27°C) in 24 hours. Vacuum may be removed after 2 hours.

20. Turn off vacuum pump. Remove polyvinyl sheet (12), tube (10), tape (9), fiberglass cloth (8), fabric (7), and peel ply (6).



21. **Fair adhesive squeezeout** to blade surface. Use abrasive paper (E9).

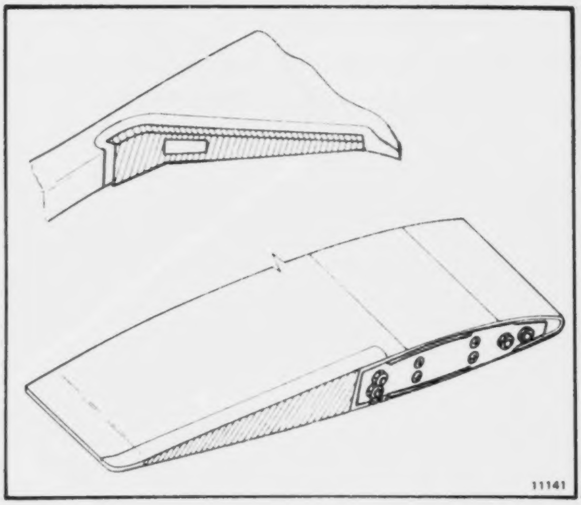
INSPECT

22. **Weigh unused adhesive** in mixing cup. Subtract weight recorded in step 11. The result is the weight of the repair for balance weight adjustment.

FOLLOW-ON MAINTENANCE:

Adjust blade balance weights (Task 5-82.1, chart 1).

Refinish repair area (Task 5-82).



END OF TASK

5-76.1 REPLACE TIP END CAP 5-76.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic Tool Kit, NSN 5180-00-323-4692

Torque Wrench, 0 to 150 inch-pounds

Materials:

Cloth (E120)

Gloves (E186)

Naphtha (E245)

Antiseize Compound (E76)

Tape (E388) or equivalent

Personnel Required:

Medium Helicopter Repairer

Inspector

Equipment Condition:

Battery Disconnected (Task 1-39)

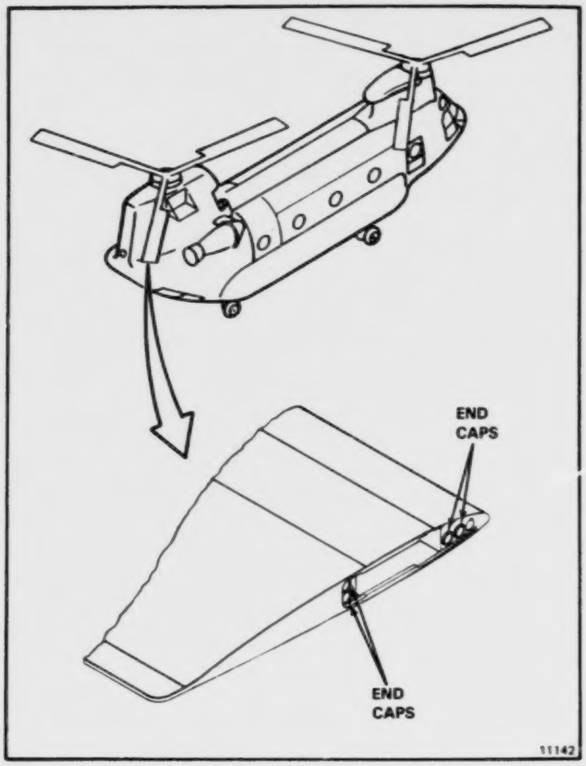
Electrical Power Off

Hydraulic Power Off

Blade positioned Over Tunnel, One Forward and One Aft Blade Tied Down (Task 1-26)

Work Platforms Open as Required (Task 2-2)

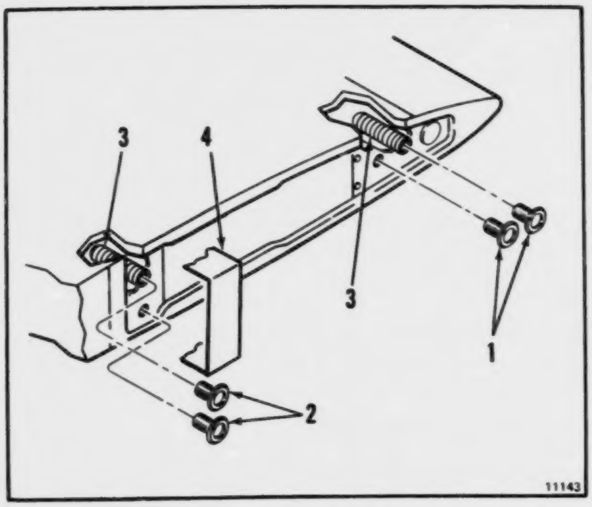
Blade Tip Cover Removed (Task 5-73)



NOTE

Procedure is same to replace any weight tube end cap. Forward blade tip end cap is shown here.

1. **Remove slotted end caps** (1) and (2) from weight tube (3).
2. Apply tape (E388) (4) over end of each set of weight tubes (3) to retain weights.



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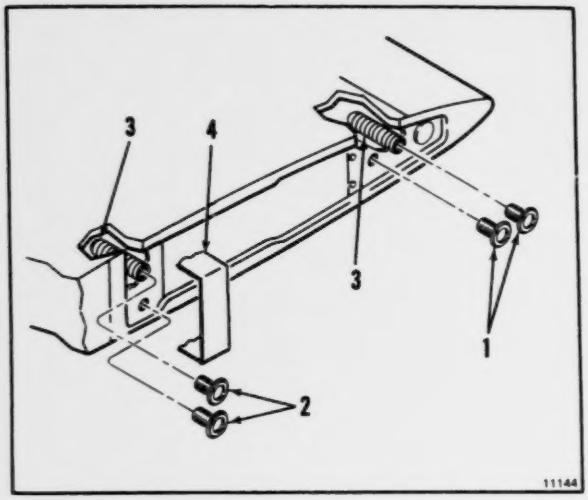
5-76.1 REPLACE TIP END CAP (Continued) 5-76.1

WARNING

Naphtha (E245) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. **Clean thread of replacement end caps (1 and 2).** Use clean cloth (E120) saturated with naphtha (E245). Wipe dry with clean cloth.
4. Remove tape (4) from weight tube (3).
5. Apply antiseize compound (E76) to thread of tip end caps (1 and 2). Screw caps into each set of weight tubes (3). Torque to 125 inch-pounds.

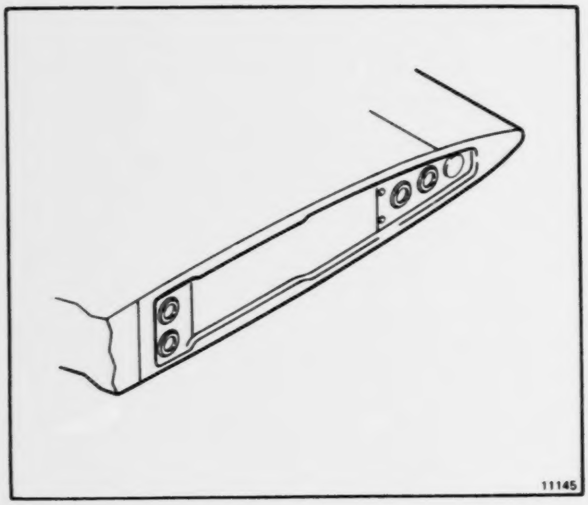


FOLLOW-ON MAINTENANCE:

Install tip cover (Task 5-74).

Close work platforms (Task 2-2).

Remove blade tiedown lines (Task 1-26).



END OF TASK

5-77 TIP SEAL — MAJOR REPAIR (AVIM) 5-77

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit, NSN 5180-00-323-4876

Vacuum Cleaner

Materials:

- Abrasive Paper (E7)
- Gloves (E186)
- Cloth (E120)
- Acetone (E20)
- Teflon Tape (E399)
- Aluminum (E70)
- Sealant (E336)
- Masking Tape (E388)
- Wood Spatula (E424)

Personnel Required:

- Aircraft Structural Repairer
- Inspector

References:

TM 55-1520-240-23P

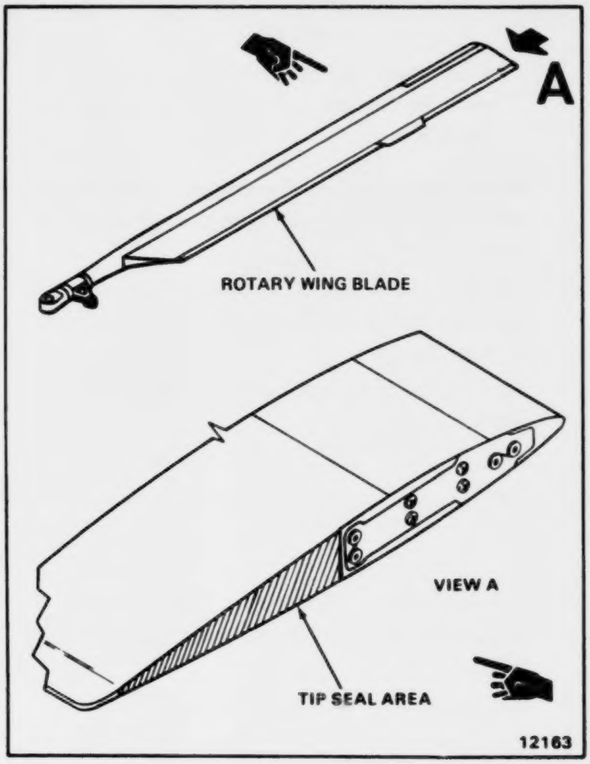
Equipment Condition:

Off Helicopter Task

General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



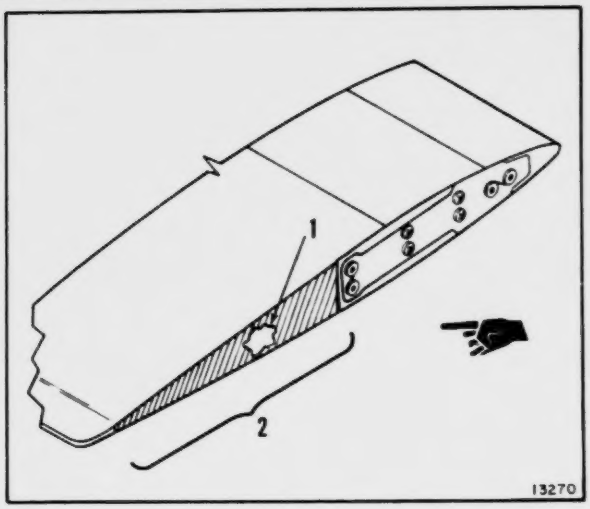
GO TO NEXT PAGE

5-77 TIP SEAL — MAJOR REPAIR (AVIM) (Continued) 5-77

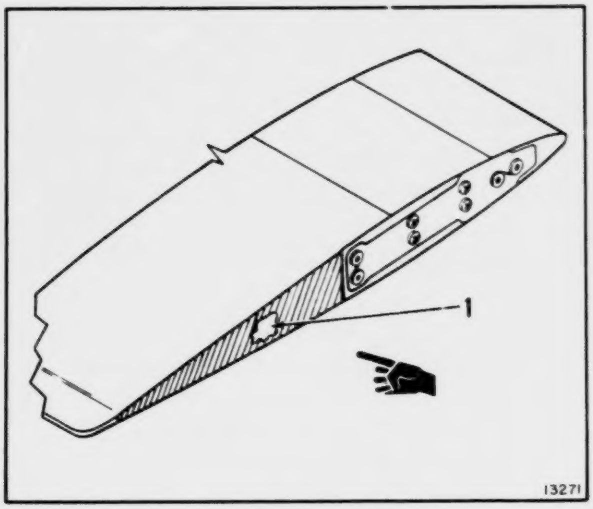
NOTE

This repair not applicable to blades with tip sealant covered by fiberglass doubler.

1. **Remove loose or damaged material (1) from tip sealant (2).** Use pocket or utility knife.
2. Check for bond voids in sealant (2). Voids are indicated by soft spots. Remove sealant to expose voids.
3. Trim material around damage (1) to a feather edge.



4. Clean damaged area (1). Use cloth (E120) damp with acetone (E20). Wear gloves (E186).
5. Wipe area dry. Use cloth (E120).
6. Mask fairing skin, and trailing edge of tip cover, if necessary. Use teflon tape (E399).



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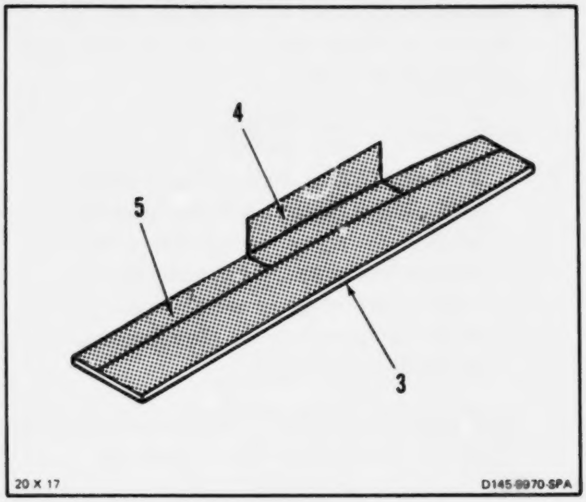
5-77 TIP SEAL — MAJOR REPAIR (AVIM) (Continued) 5-77

7. Cut piece of aluminum (E70) (3) to 4-inch x 18-inch size.
8. Position piece of teflon tape (E399) (4) adhesive, side up, on aluminum sheet (E70) (3). Hold tape (4) in place. Apply tape (E399) (5) over entire plate (3) and tape (4).



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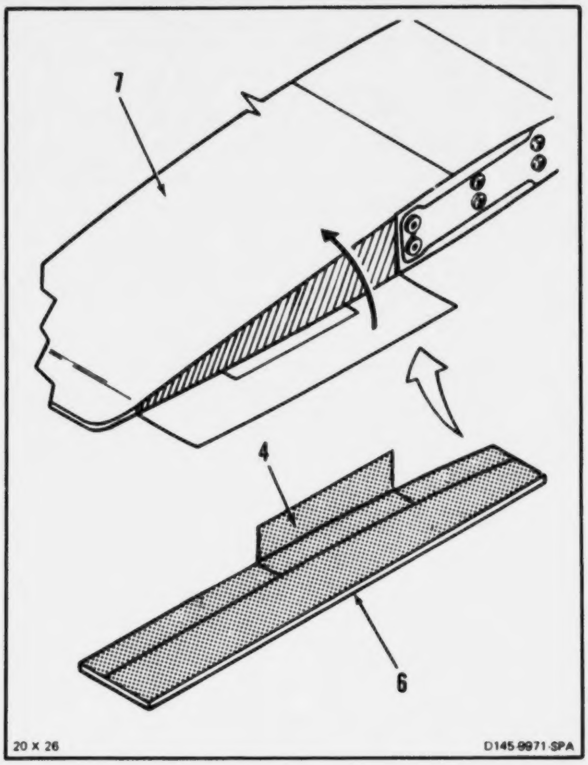
5-77 TIP SEAL — MAJOR REPAIR (AVIM) (Continued) 5-77

9. **Attach end mold (6) to blade (7).** Use tape (4) as hinge. Secure tape to blade. Use masking tape (E388).

WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

10. **Mix sealant (E336).** Follow instructions on container. Blend until color is uniform.
11. **Fill fairing void** slowly. Use sealant (E336). As void is filled, raise end mold (6) toward vertical. Avoid air bubbles.
12. Let sealant (E336) stand several minutes. Break any bubbles that surface. Add sealant to fill any voids that remain. **Fair sealant.** Use wood spatula (E424).
13. Apply teflon tape (E399) to hold end mold (6) against blade (7).
14. **Allow sealant (E336) to cure 6 hours at 70°F to 80°F (21°C to 27°C).**
15. **Remove** masking tape (E388) and **end mold (6).**
16. Check for absence of voids, and smooth fairing.
17. (Deleted).
18. **Trim and sand repaired area.** Use pocket knife and abrasive paper (E7).



INSPECT

FOLLOW-ON MAINTENANCE:

Cover tip seal with fiberglass cloth (Task 5-76, steps 8 thru 21).

Refinish blade repair (Task 5-82).

END OF TASK

5-77.1 REPLACE LIGHTNING PROTECTION JUMPER WIRE 5-77.1

INITIAL SETUP

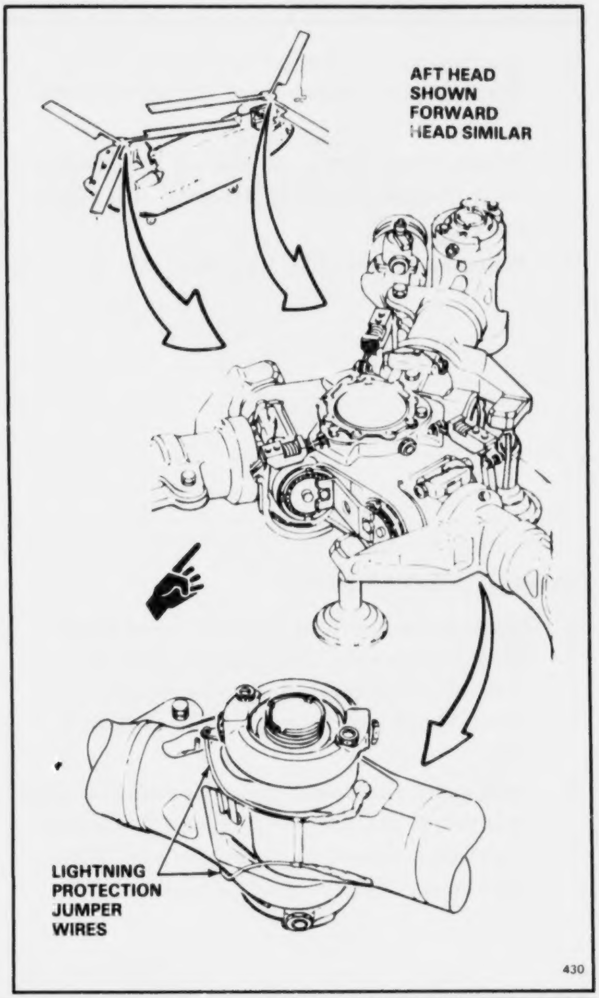
Applicable Configurations:
All

Tools:
Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Torque Wrench, 5 to 50 Inch-Pounds

Materials:
Sealant (E336)
Acetone (E20)
Cloth (E120)
Abrasive Paper (E9)
Naphtha (E245)
Lacquer, Black, Lusterless (E215)
Lacquer Thinner (E415)

Personnel Required:
Aircraft Structural Repairer
Inspector

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-wing Blade Tied Down (Task 1-26)
Work Platform Open (Task 2-2)


AFT HEAD SHOWN FORWARD HEAD SIMILAR
LIGHTNING PROTECTION JUMPER WIRES
430

CAUTION

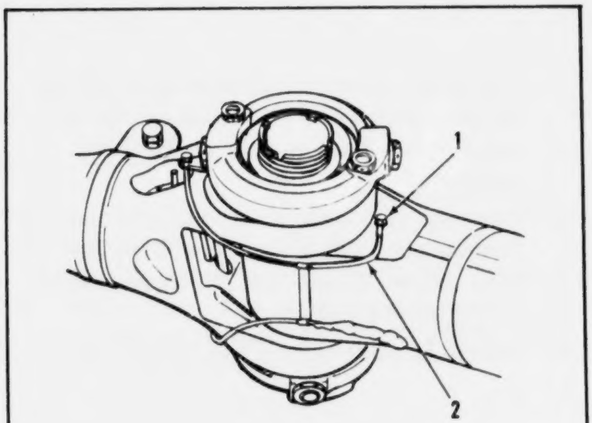
Ensure that blade surface is not damaged during sealant removal.

NOTE

Procedure is same to remove any of 12 lightning protection jumper wires.

REMOVE JUMPER WIRE

1. **Remove sealant from bolt (1) and jumper wire (2).** Use utility knife and chisel.



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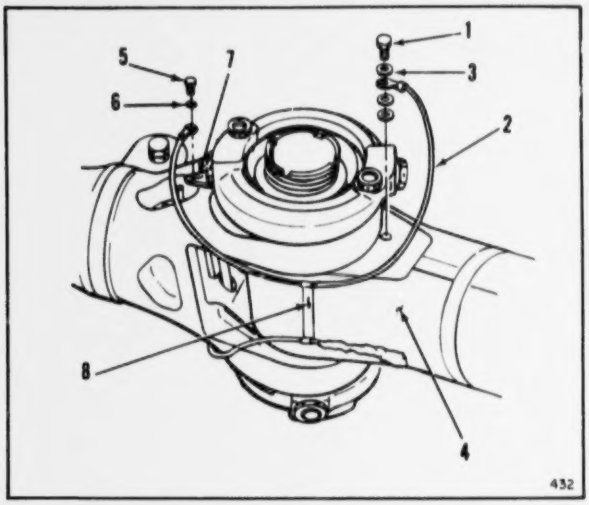
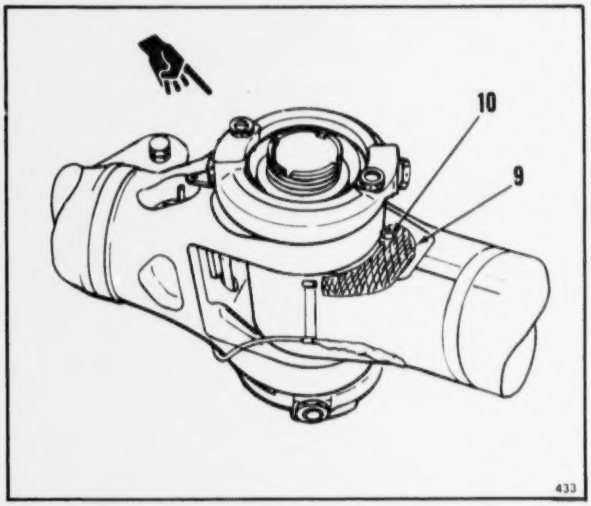
5-77.1 REPLACE LIGHTNING PROTECTION JUMPER WIRE (Continued) 5-77.1

2. Remove bolt (1) and three washers (3) to **disconnect jumper wire (2) from blade (4).**
3. Remove bolt (5) and washer (6) to **disconnect jumper wire (2) from oil manifold tube (7).**
4. **Remove cable (2)** from clamp (8).

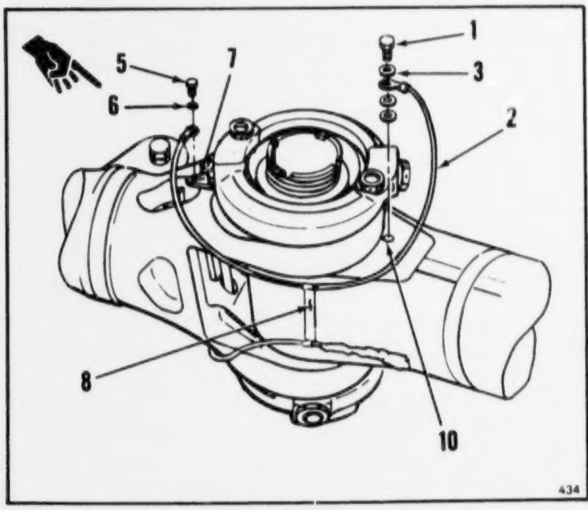


INSTALL JUMPER WIRE

5. **Remove paint and sealant from strip (9)** 2 inches wide along jumper wire path and around insert (10). Expose fiberglass/epoxy surface. Use abrasive paper (E9).
6. **Wipe the prepared area.** Use cloth (E120) damp with acetone (E20). Wipe with a clean dry cloth before acetone evaporates. Make sure insert (10) is free of foreign matter.



7. **Position** one end of **jumper wire (2) on oil manifold tube (7).** Install washer (6) and bolt (5). **Torque bolt to 35 inch-pounds .**
8. **Position** two washers (3) and other end of **jumper wire (2) on insert (10).** Install third washer (3) and bolt (1). **Torque bolt to 30 inch-pounds .**
9. **Install jumper wire (2) in clamp (8).**



GO TO NEXT PAGE

5-77.1 REPLACE LIGHTNING PROTECTION JUMPER WIRE (Continued) 5-77.1

WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

10. **Apply sealant (E336) over bolt (1).** Use enough sealant to cover 2 inch diameter area. **Apply sealant over jumper wire (2)** between bolt and clamp (8). Minimum sealant thickness shall be 0.6 inch.
11. Allow sealant to cure 6 hours at 70°F (21°C).

INSPECT

WARNING

Naphtha (E245) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

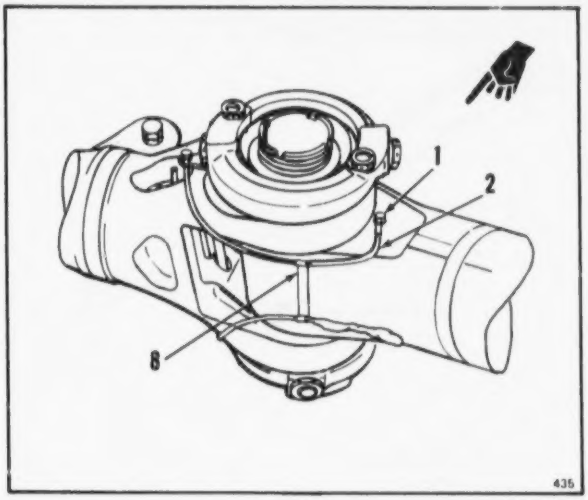
12. Wipe area around sealed wire (2).Use cloths (E120) damp with naphtha (E245). Wipe naphtha dry before it evaporates. Wipe until cloths stay clean.

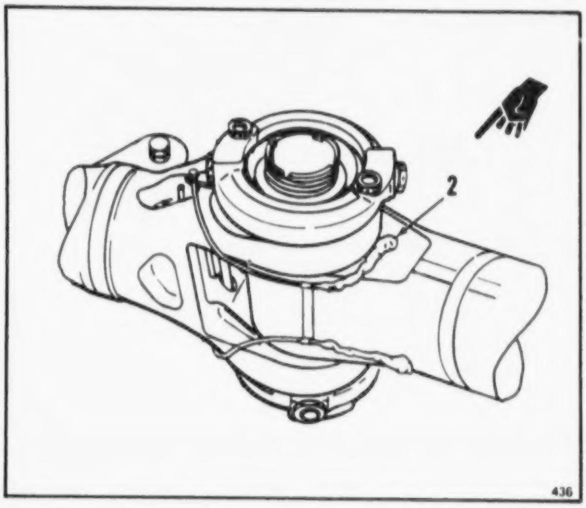
WARNING

Lacquer (E215) is extremely flammable. It can be toxic. Keep away from heat, sparks, or open flames. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Thinner (E415) is flammable and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from heat or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.





13. Thin black lacquer (E215). Use thinner (E415). Follow manufacturer's instructions.
14. **Apply** two coats of **thinned lacquer (E215) to sealed wire (3).** Allow to dry 45 minutes between coats.

FOLLOW ON MAINTENANCE:

Close work platform (Task 2-2).
Remove tiedown lines from blades (Task 1-26).

END OF TASK

5-78 REMOVE LIGHTNING PROTECTION JUMPER WIRE INSERT 5-78

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit,
NSN 5180-00-323-4876
Twist Drill, 11/32-Inch
Screw Extractor, 5/16-Inch
Heat Gun

Materials:

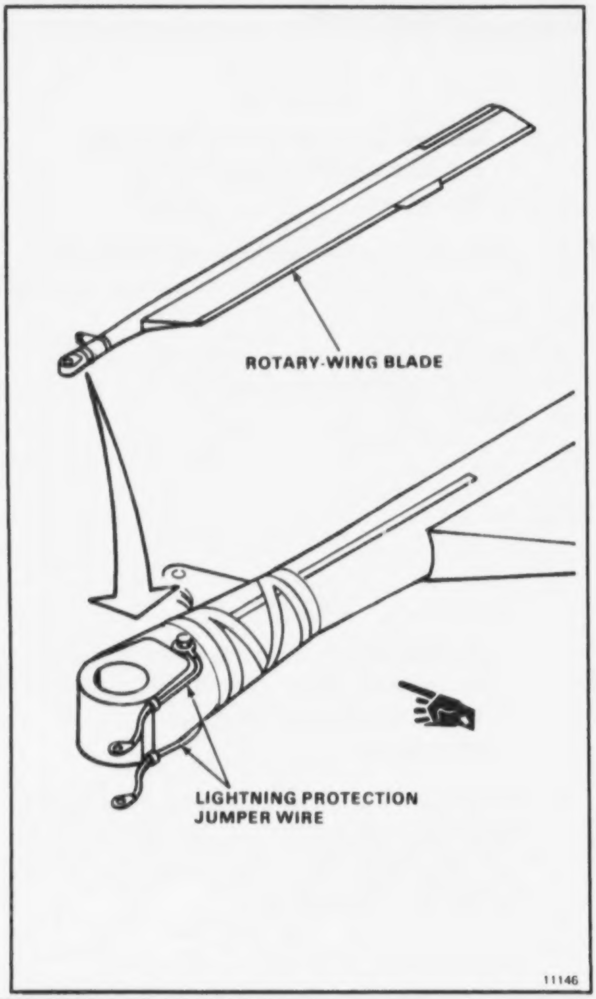
Temperature Indicating Strips (E413)

Personnel Required:

Aircraft Structural Repairer

Equipment Condition:

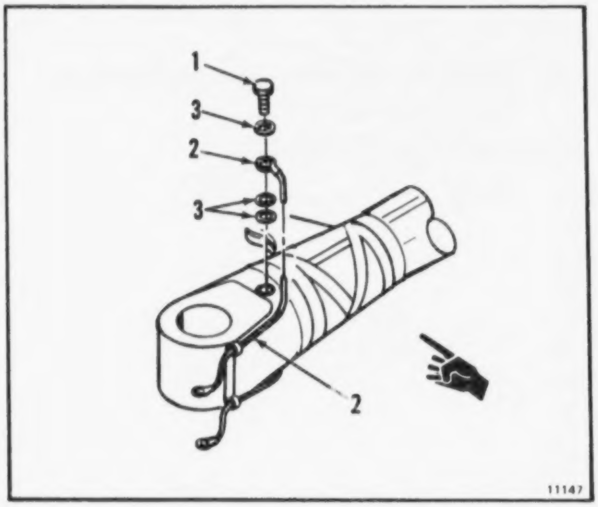
Off Helicopter Task



NOTE

Procedure is same to remove any lightning protection ground cable insert. There are two ground cable inserts in each rotary-wing blade.

1. Remove sealant from bolt (1) and jumper wire (2). Use knife and file.
2. Remove bolt (1) and three washers (3). **Disconnect jumper wire (2).**



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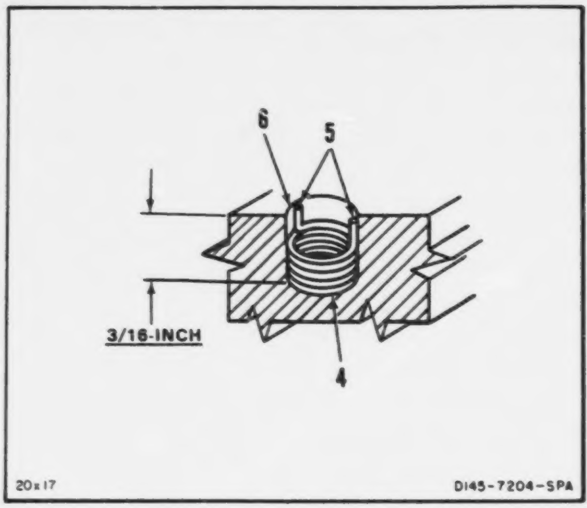
5-78 REMOVE LIGHTNING PROTECTION JUMPER WIRE INSERT (Continued) 5-78

CAUTION

Do not enlarge hole when drilling out insert. Blade will be damaged.

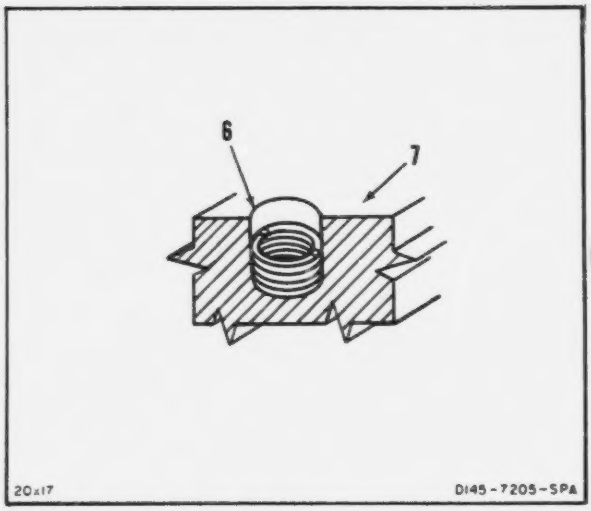
3. **Drill out inside diameter of insert (4).** Use 11/32-inch drill and mechanical stop set to 3/16-inch.
4. **Bend locking keys (5)** toward center of hole (6) **until keys break off.** Use small chisel.



CAUTION

Do not allow blade temperature to exceed 160°F (71°C). Higher temperature can damage fiberglass.

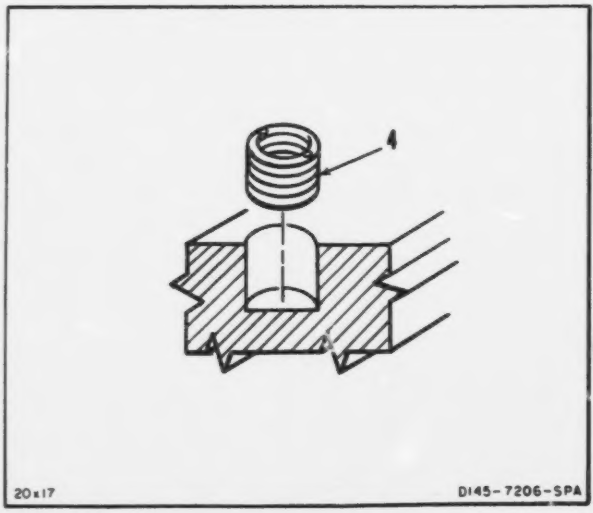
5. **Heat blade (7) around insert hole (6) to 140°F to 160°F (60°C to 71°C).** Use heat gun. Use temperature indicating strips (E413) to monitor temperature.



6. **Remove remaining part of insert (4).** Use screw extractor.

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-79 INSTALL LIGHTNING PROTECTION JUMPER WIRE INSERT 5-79

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Installation Tool (T25)
Heat Lamp
Torque Wrench, 5 to 50 Inch-Pounds
Compressed Air Source

Materials:

Temperature Indicating Strips (E413)
Adhesive (E40) or (43)
Sealant (E336)
Acetone (E20)
Cloth (E120)
Gloves (E186)

Parts:

Insert

Personnel Required:

Aircraft Structural Repairer
Inspector

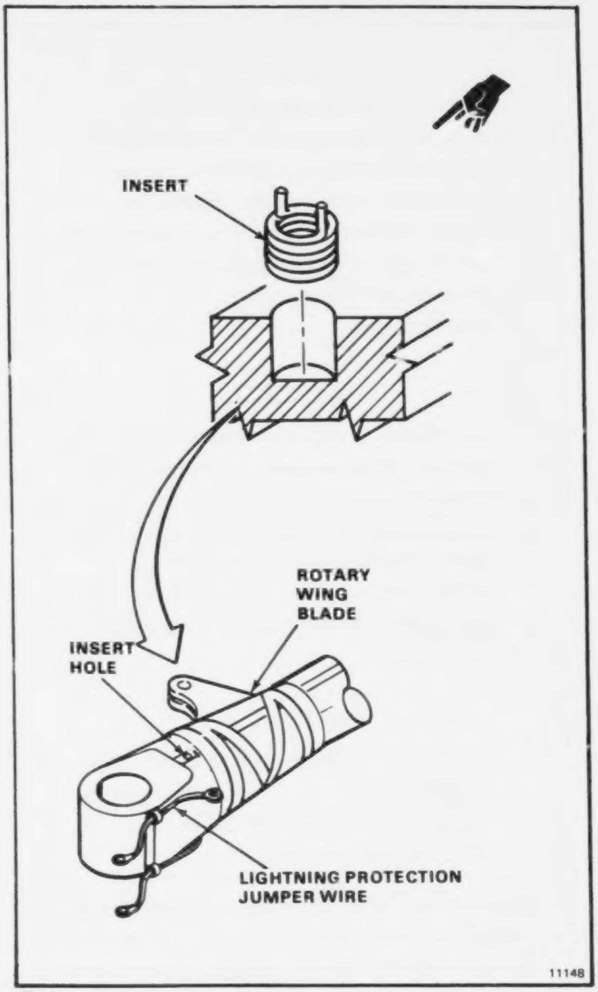
References:

TM 55-1520-240-23P

General Safety Instructions:

WARNING

Adhesive (E40) is toxic and can irritate skin. Use in well-ventilated area. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.


INSERT
ROTARY WING BLADE
INSERT HOLE
LIGHTNING PROTECTION JUMPER WIRE
11148
20 x 34

GO TO NEXT PAGE

5-79 INSTALL LIGHTNING PROTECTION JUMPER WIRE INSERT (Continued) 5-79

WARNING

Do not use more than 30 psi compressed air for cleaning purposes. Debris propelled under pressure can cause injury to eyes. Use source of compressed air under 30 psi and eye protection to prevent injury to personnel.

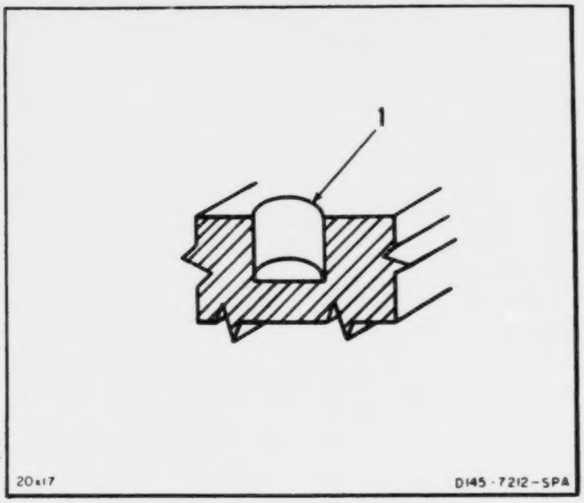
WARNING

Acetone (E20) can form toxic vapors if exposed to flame. Use in well-ventilated area, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

Procedure is same to install any lightning protection ground cable insert. There are two ground cable inserts in each rotary-wing blade.

1. Clean insert hole (1). Use compressed air. Wipe out hole. Use cloth (E120) damp with acetone (E20). **Wear goggles to protect eyes.** Wear gloves (E186).



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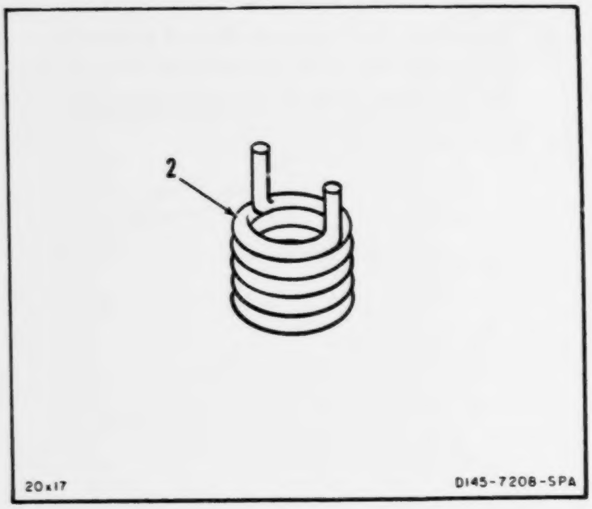
5-79 INSTALL LIGHTNING PROTECTION JUMPER WIRE INSERT (Continued) 5-79

2. Mix tube of prepackaged adhesive (E40) or (E43). Follow instructions in adhesive kit. Wear gloves (E186).

NOTE

Working life of adhesive is 30 minutes.

3. **Apply thin coat of adhesive (E40) or (43) to outside surface of insert (2).** Wear gloves (E186).



4. **Install insert (2)** into blade (3). Use installation tool (T25) (4). Tap tool to drive locking keys (5) into position. Remove tool.

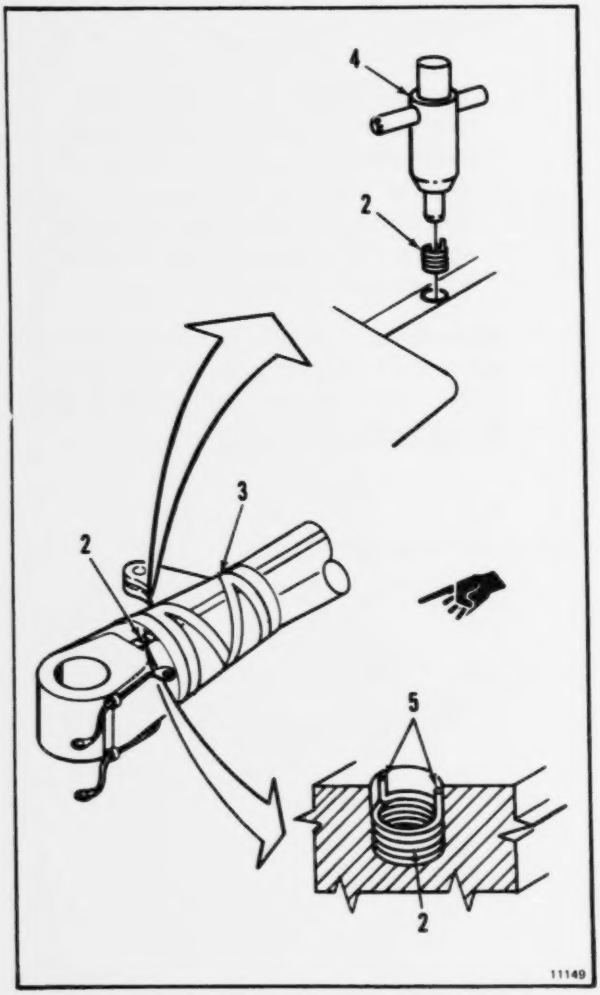
CAUTION

Do not allow blade temperature to exceed 160°F (71°C). High temperature can damage fiberglass.

5. **Heat insert (2) to 140°F to 160°F (60°C to 71°C)for 2 hours to cure adhesive.** Use heat lamp. Use temperature indicating strips (E413) to monitor temperature.

NOTE

If heat lamp is not available, adhesive may be cured at 70°F to 80°F (21°C to 27°C) for 24 hours.



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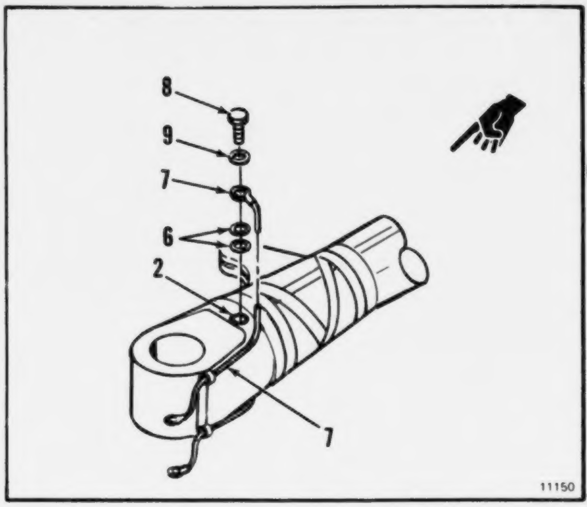
5-79 INSTALL LIGHTNING PROTECTION JUMPER WIRE INSERT (Continued) 5-79

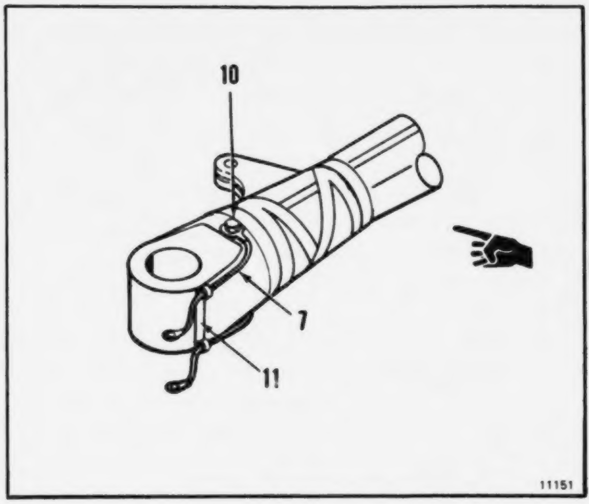
6. **Position** two washers (6) and **wire (7)** over insert (2). **Install bolt (8)** and washer (9). **Torque bolt to 30 inch-pounds.**



WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, and clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

7. Apply sealant (E336) over wire terminal (10) and wire (7) to clamp (11). Wear gloves (E186). Allow sealant to cure at 70°F to 80°F (21°C to 27°C) for 6 hours.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-80 REMOVE TIEDOWN RECEIVER 5-80

INITIAL SETUP

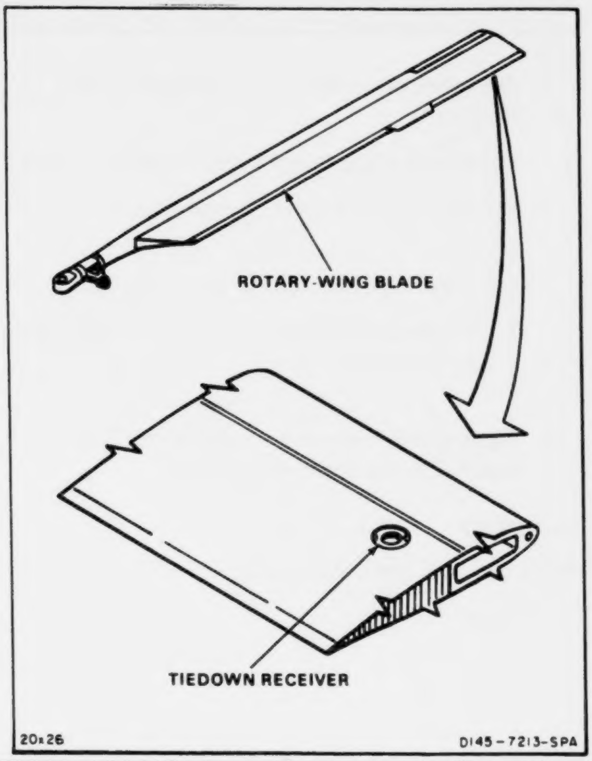
Applicable Configurations:
All

Tools:
Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Tiedown Receiver Tool (T117)
Electric Heater, Gun-Type
Aluminum Chisel (Appx D)
Tap Wrench

Materials:
Temperature Indicating Strips (E413)

Personnel Required:
Aircraft Structural Repairer
Inspector

Equipment Condition:
Off Helicopter Task



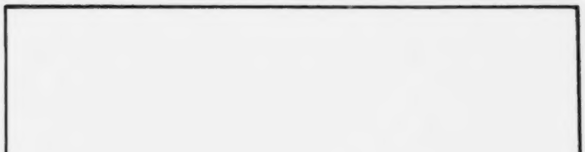
CAUTION

Do not heat blade over 160°F (71°C). Fiberglass can be damaged.

NOTE

Procedure is same to remove the tiedown receiver from any rotary-wing blade. There is one tiedown receiver on the underside of each blade.

1. Heat area around tiedown receiver (1) to 140°F to 160°F (60°C to 71°C) to soften adhesive. Use gun-type electric heater. Use temperature indicating strips (E413) to monitor temperature .
2. **Remove sealant from around receiver (1).** Use aluminum chisel.



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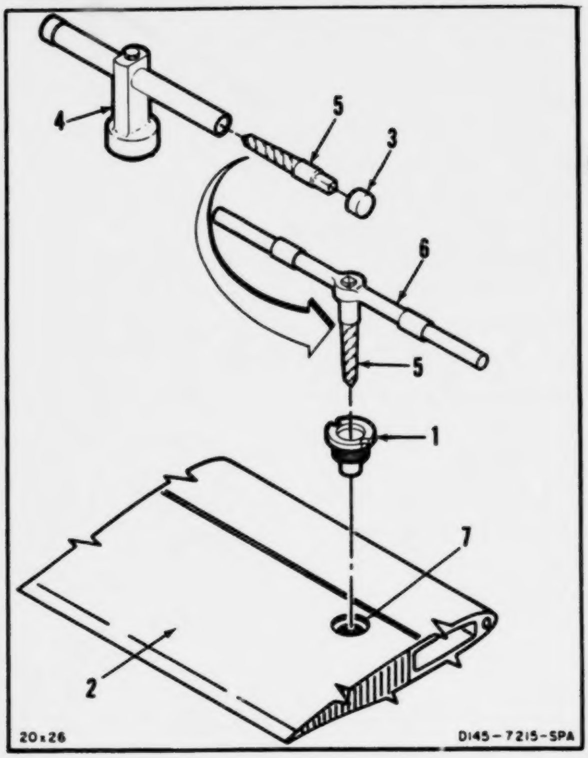
5-80 REMOVE TIEDOWN RECEIVER (Continued) 5-80



3. **Remove receiver (1)** from blade (2) as follows:
   a. Remove cap plug (3) from tool (T117) (4).
   b. Remove extractor (5) from tool (T117) (4).
   c. Install extractor (5) in tap wrench (6).
   d. Remove receiver (1). Use tap wrench (6) and extractor (5).

4. Remove sealant from countersink (7) on blade (2). Use aluminum chisel.

INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-81 INSTALL TIEDOWN RECEIVER 5-81

INITIAL SETUP

Applicable Configurations:
All

Tools:
Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Tiedown Receiver Tool (T25)
Drive Handle, 1/2-Inch
Source of Compressed Air
Heat Lamp
Trip Balance, NSN 6670-00-401-7195

Materials:
Adhesive (E40, E41 or E43))
Gloves (E186)
Temperature Indicating Strips (E413)
Wood Spatula (E424)
Polyethylene Cup (E157)

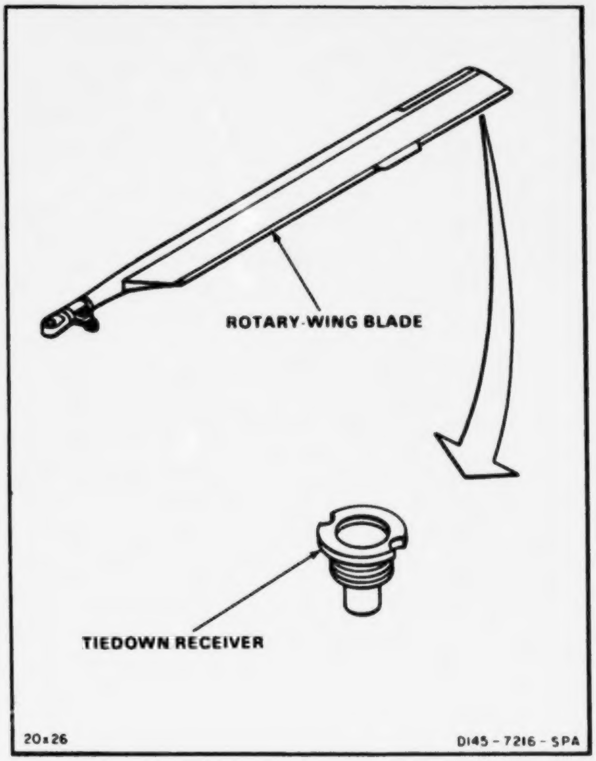
Personnel Required:
Aircraft Structural Repairer
Inspector

References:
TM 55-1520-240-23P

General Safety Instructions:

WARNING

Sealant may irritate skin and cause burns. Avoid contact with skin, eyes and clothing. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Get medical attention for eyes.



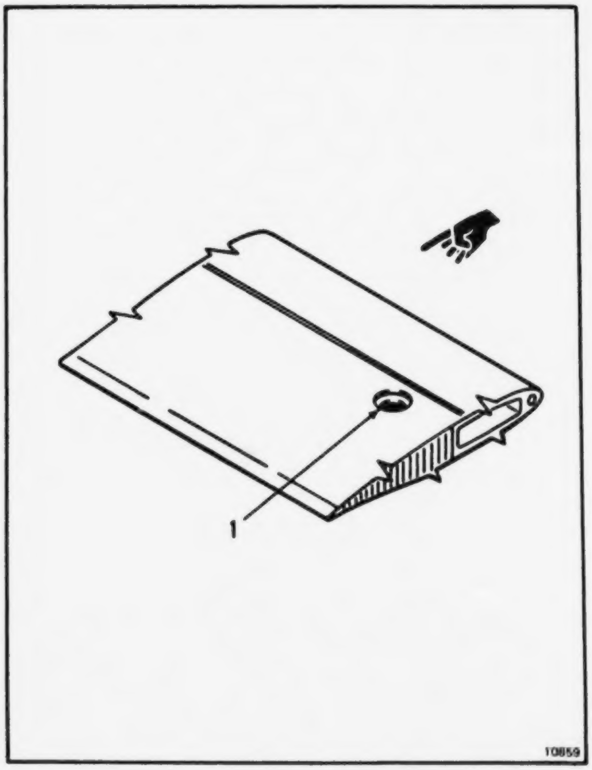
WARNING

Do not use more than 30 psi compressed air for cleaning purposes. Debris propelled under pressure can cause injury to eyes. Use source of compressed air under 30 psi and eye protection to prevent injury to personnel.

NOTE

Procedure is same to install any tiedown receiver. There is one tiedown receiver on the underside of each rotary-wing blade.

1. Clean receptacle (1). Use compressed air. Wear goggles to protect eyes.



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5-81 INSTALL TIEDOWN RECEIVER (Continued) 5-81

2. Mix a small amount of adhesive (E40, E41, or E43) as follows:

   a. For adhesive (E40), follow directions on the kit.

   NOTE

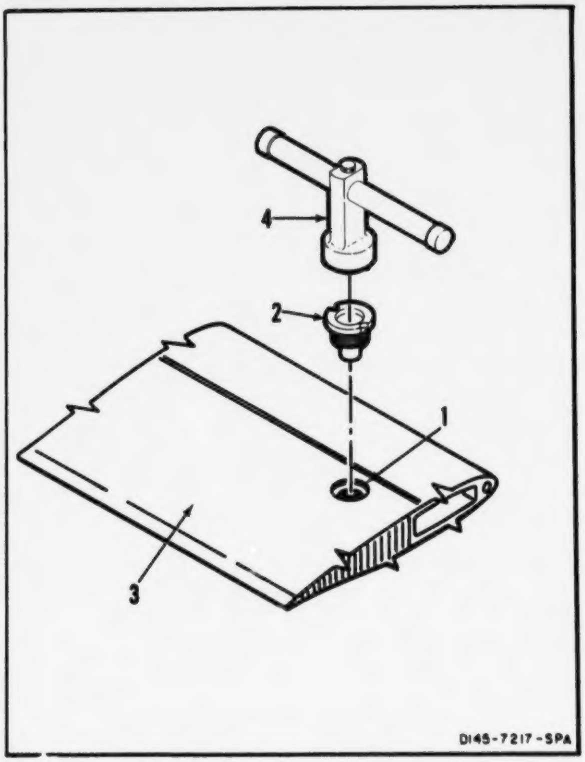
   Prepackaged adhesive (E40) is preferred. Use adhesive (E41) or (E43) only if prepackaged kit is not available.

   b. For adhesive (E41), weight 100 parts of resin and 23 parts of hardener. Use trip balance. Mix in polyethylene cup (E157) until color is uniform. Use wood spatula (E424). Wear gloves (E186).

   c. For adhesive (E43), weigh 7 parts of gray hardener and 5 parts of white base. Use trip balance. Mix in polyethylene cup (E157) until color is uniform. Use wood spatula (E424). Wear gloves (E186).

3. **Apply adhesive to countersink (1) and flange** of receiver (2). Wear gloves (E186).

4 **Install receiver (2)** into blade (3). Use tool (T25) (4).



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5. **Taper adhesive (5) around receiver (2).** Spread adhesive until it extends 1/4-inch from receiver. Use additional adhesive, if necessary.

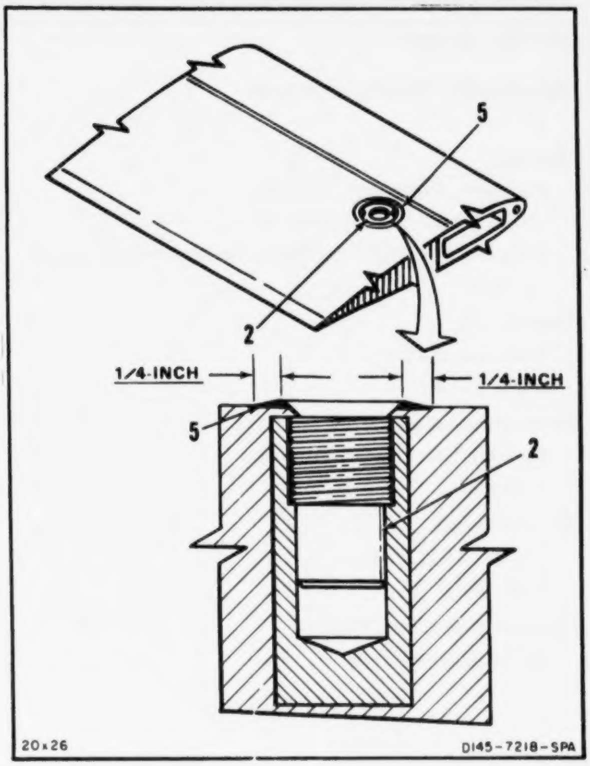
CAUTION

Blade temperature must not exceed 160°F (71°C) . Overheating will damage fiberglass.

6. Cure repair at 140°F (60°C) to 160°F (71°C) for 2 hours . Use heat lamp. Monitor blade temperature. Use temperature indicating strips (E413).

NOTE

If heat lamp is not available, cure at 70°F to 80°F (21°C to 27°C) for 24 hours .



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-81.1 REPLACE SHOCK ABSORBER BRACKET BUSHINGS 5-81.1

INITIAL SETUP

Applicable Configurations:
All

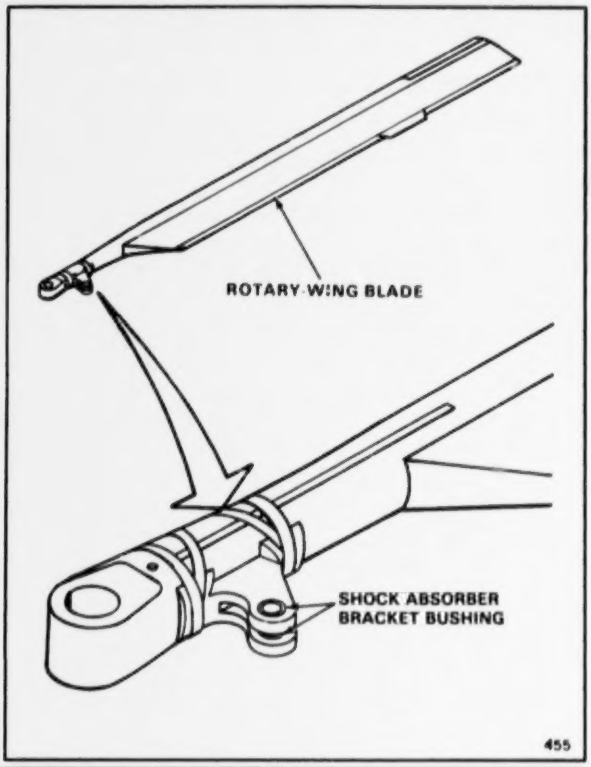
Tools:
Airframe Repairer Tool Kit, NSN 5180-00-323-4876
Shock Absorber Bracket Bushing Puller/Pusher (T98)

Materials:
Acetone (E20)
Cloth (E120)

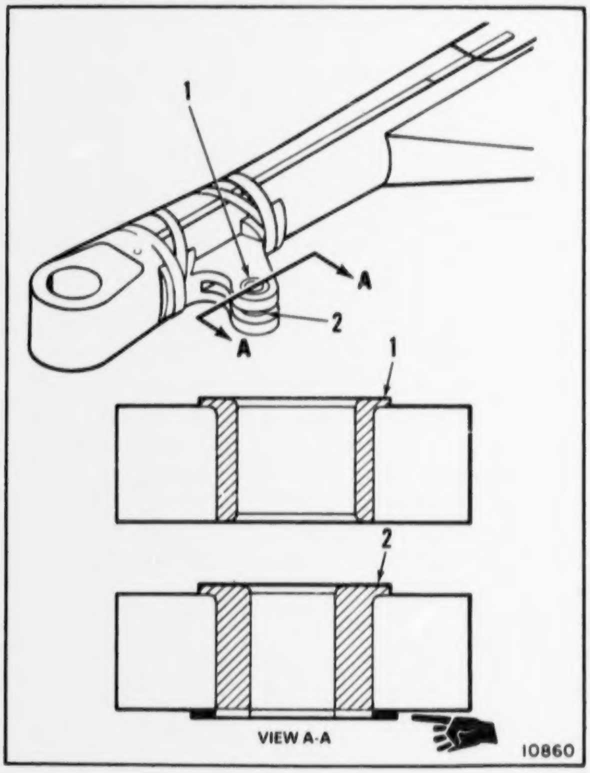
Personnel Required:
Aircraft Structural Repairer
Inspector

References:
TM 55-1520-240-23
Task 5-82

Equipment Condition:
Off Helicopter Task



1. **Inspect bushings** (1 and 2) for wear, nicks, and scratches.
   a. On the top surface of bushings (1 and 2), nicks or scratches 0.025 inch or less deep can be blended out. On all other surfaces of both bushings, wear and damage is limited to a depth of 0.005 inch.
   b. Damage greater than that specified in step a. requires replacement of the bushing.



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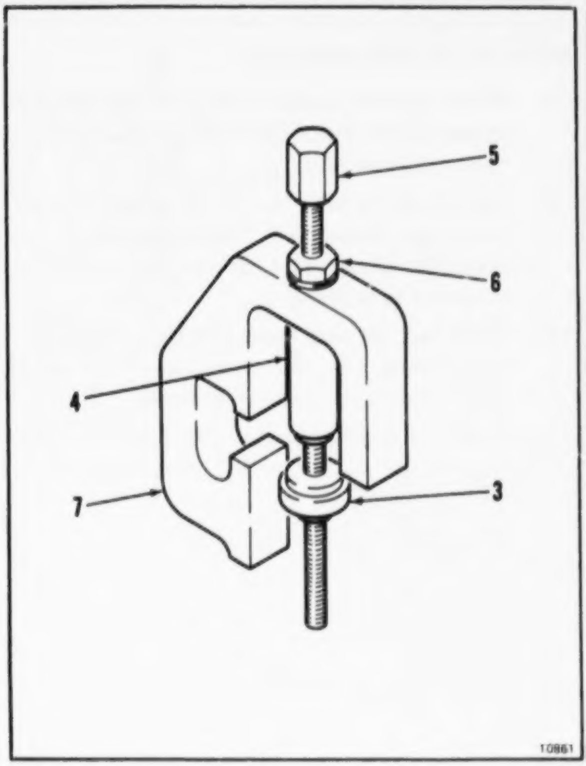
5-81.1 REPLACE SHOCK ABSORBER BRACKET BUSHINGS (Continued) 5-81.1

2. **Prepare pusher/puller** (T98) for use:
   a. Remove pusher/puller (3) and pusher/guide (4) from threaded rod (5).
   b. Remove rod (5) and nut (6) from yoke (7).



NOTE

Removal and installation of bushings is same for forward or aft rotary-wing blades.

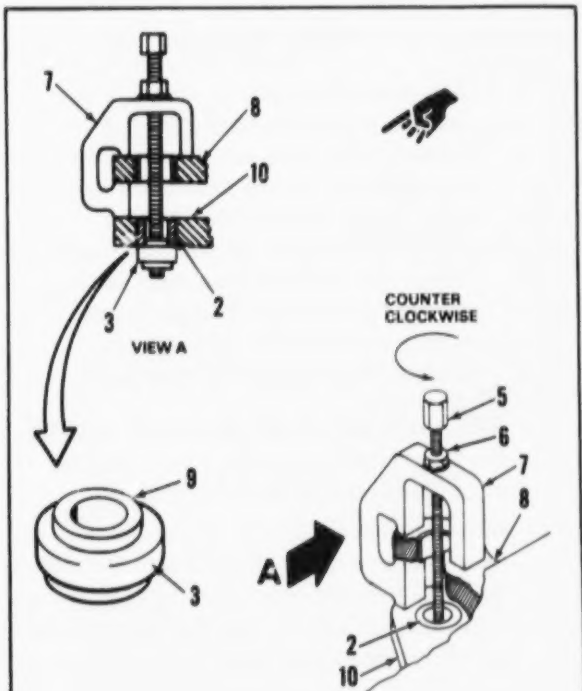
REMOVE LOWER BUSHING

3. **Position yoke (7)** over upper plate (8) of lag damper bracket.

NOTE

The flange side of both bushings is on upper surface of bracket plates.

4. Align hole in yoke (7) with bushings (1) and (2). **Install rod (5), with nut (6)** through hole in yoke and bushings.
5. **Thread pusher/puller (3) on rod (5).** With the small diameter pilot (9) facing bushing (2). Seat pilot in bushing (2).
6. **Hold nut (6) and turn rod (5) counterclockwise.** Use two wrenches. Turn rod (5) until bushing (2) is out of lower bracket plate (10).
7. Remove pusher/puller (3), bushing (2), rod (5) with nut (6), and yoke (7).



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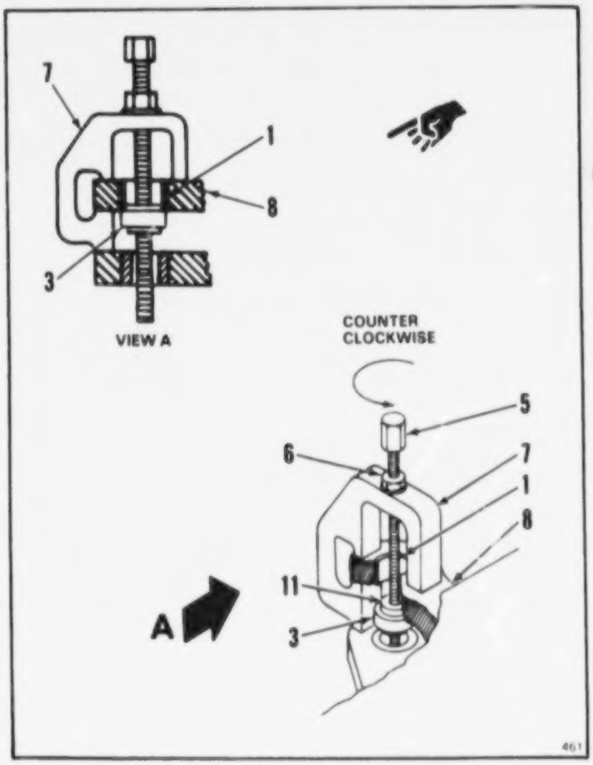
5-81.1 REPLACE SHOCK ABSORBER BRACKET BUSHINGS (Continued) 5-81.1

REMOVE UPPER BUSHING

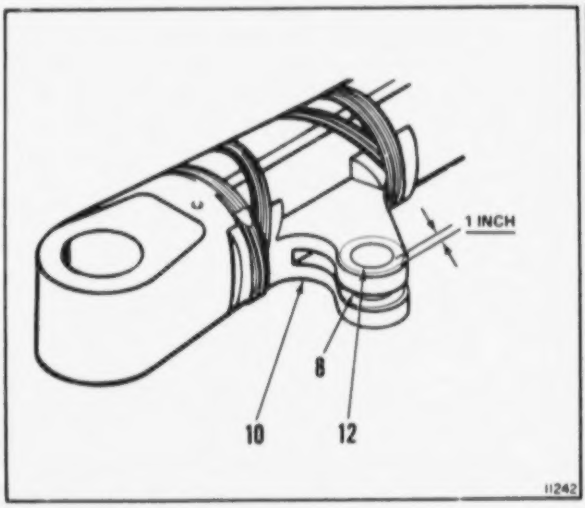
8. **Place pusher/puller yoke (7) on bracket upper plate** (8). Align hole in yoke with hole in bushing (1).
9. Install rod (5), with nut (6), through yoke (7) and upper bushing (1). **Thread pusher/puller (3) on rod (5)** until large pilot (11) is seated in bushing.
10. **Hold nut (6) and turn rod (5) counterclockwise.** Use two wrenches. Turn rod (5) until bushing (1) is out of plate (8).
11. **Remove pusher/puller (3).** Remove rod (5) with nut (6), bushing (1) and yoke (7).



WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

12. **Remove finish from plates** (8) and (10) for 1 inch around bushing hole (12). Use cloth (E120) damp with acetone.
13. **Inspect plates (8)** and (10) in the area of finish removal for damage. If any damage in that area extends more than 1/32 inch from bushing hole (12), or hole is elongated, reject the rotary-wing blade.



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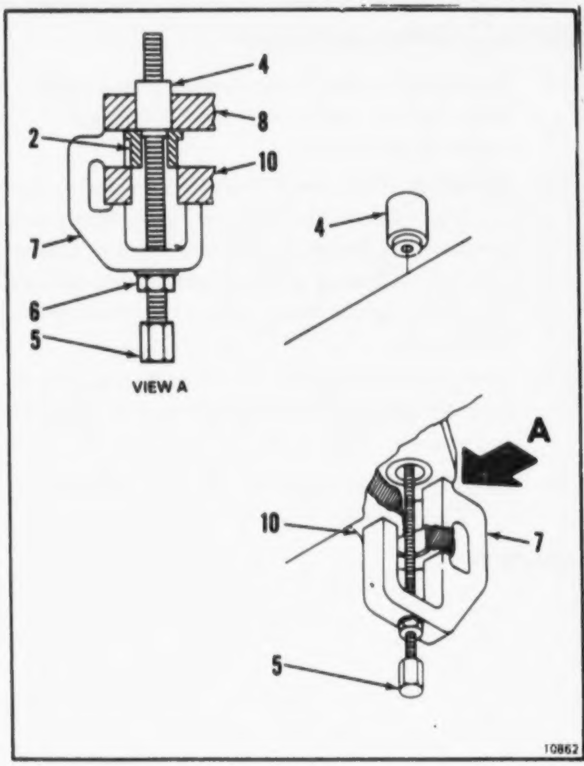
5-81.1 REPLACE SHOCK ABSORBER BRACKET BUSHINGS (Continued) 5-81.1

INSTALL LOWER BUSHING

14. **Position pusher/puller** yoke (7) on lower bracket plate (10). Align hole in yoke with holes in bracket plates.
15. **Place replacement bushing (2) between bracket plates** (8) and (10). Install rod (5), with nut (6), through yoke (7), bushing (2) and upper plate (8).
16. **Thread pusher/guide (4) and rod (5)** with small pilot end toward bushing (2). Seat pusher/guide in bushing.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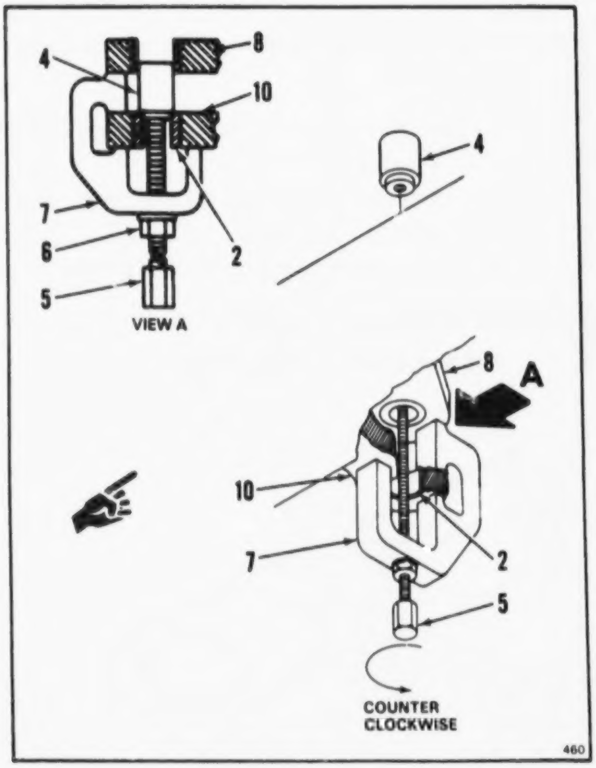
17. **Hold nut (6) and turn rod (5) counter-clockwise.** Use two wrenches. Turn rod until bushing (2) is fully seated in lower plate (10).
18. Remove rod (5) with nut (6) pusher/guide (4) and yoke (7).

INSPECT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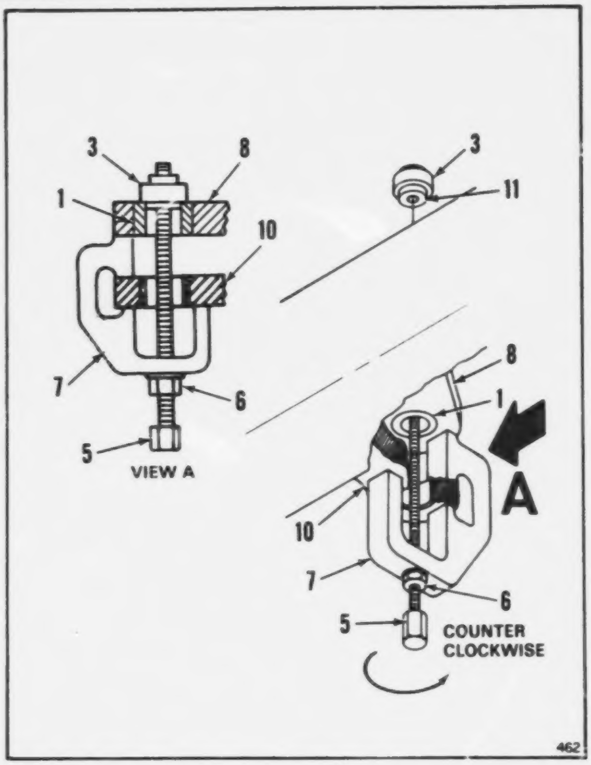
5-81.1 REPLACE SHOCK ABSORBER BRACKET BUSHINGS (Continued) 5-81.1

INSTALL UPPER BUSHING

19. **Position yoke (7) on lower plate (10).** Align hole in yoke with holes in bracket plates (8 and 10).
20. **Install rod (5), with nut (6),** through yoke (7) and bracket plates (8 and 10). **Align replacement bushing (1)** with hole in upper plate (8). **Thread pusher/puller (3) on rod (5)** until large diameter pilot (11) is seated in bushing (1).
21. Using two wrenches, hold nut (6), and **turn rod (5) counterclockwise** until bushing (1) is seated in upper plate.
22. **Remove pusher/puller** (3), rod (5) with nut (6), and yoke (7).

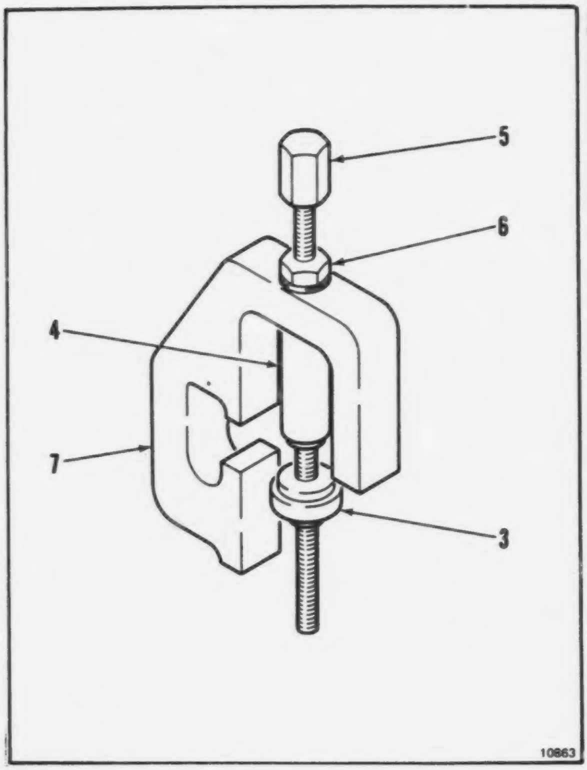
INSPECT



23. **Prepare pusher/puller** (T98) for **storage** as follows:
    a. Insert rod (5) with nut (6) through top of hole in yoke (7).
    b. Thread pusher/guide (4) on rod (5) to retain rod in yoke (7).
    c. Thread pusher/puller (3) on rod (5).

FOLLOW-ON MAINTENANCE:

Refinish bracket (Task 5-82).



END OF TASK

5-81.2 REPAIR KEVLAR SHOCK ABSORBER BRACKET WINDINGS — MINOR DAMAGE 5-81.2

INITIAL SETUP

Applicable Configurations:

All

Tools:

Heat Lamp
Respirator
Trip Balance, NSN 6670-00-401-7195

Materials:

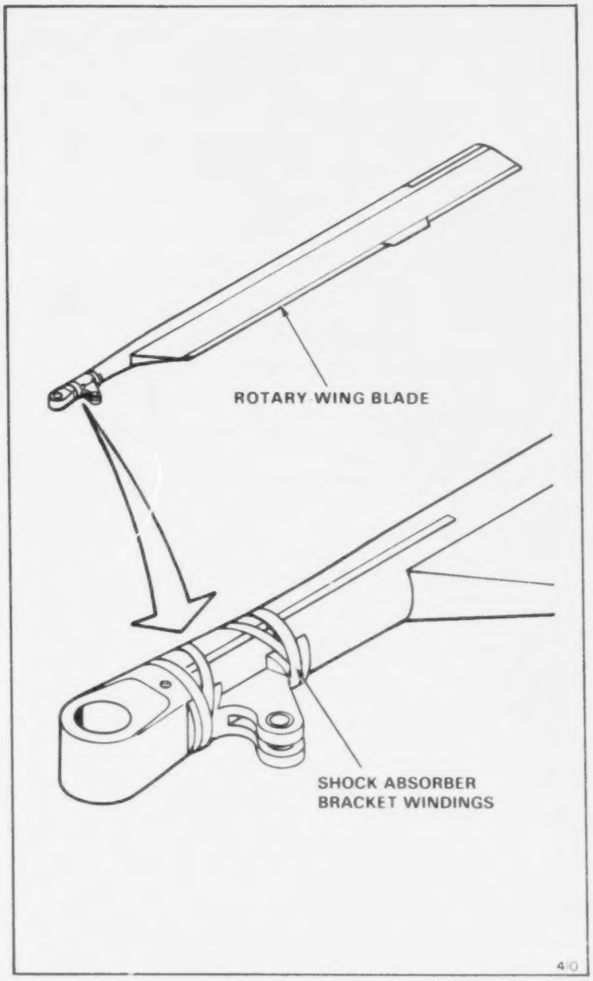
Abrasive Paper (E7 and E9)
Acetone (E20)
Adhesive (E40, E41, E43 or E47.1)
Cloth (E120)
Gloves (E186)
Peel Ply (E270)
Polyethylene Cup (E157)
Tape, Glass Cloth (E387)
Teflon Impregnated Fabric (E170)
Temperature Indicating Strips (E413)
Wood Spatula (E424)
Curing Agent (E158.1)

Personnel Required:

Aircraft Structure Repairer
Inspector

Equipment Condition:

Off Helicopter Task

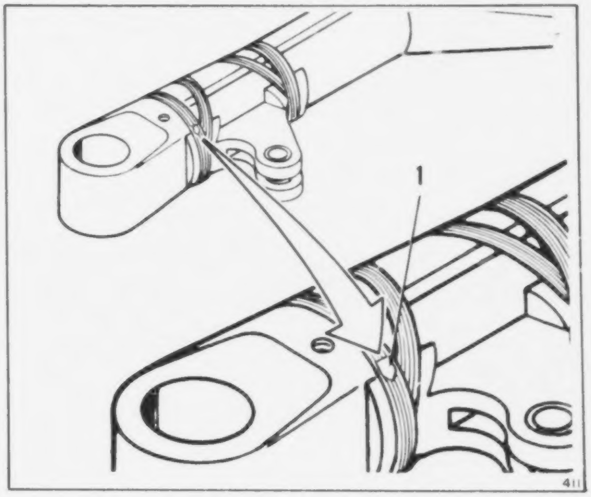


1. **Check depth of damage area (1).** Depth shall not exceed 0.005 inch. If damage is deeper than 0.005 inch, return blade for disposition. If damage is less than 0.005 inch deep, go to step 2.

CAUTION

Do not sand into filament windings.

2. **Remove finish** 1 inch around all sides of damage area (1). Use abrasive paper (E7).



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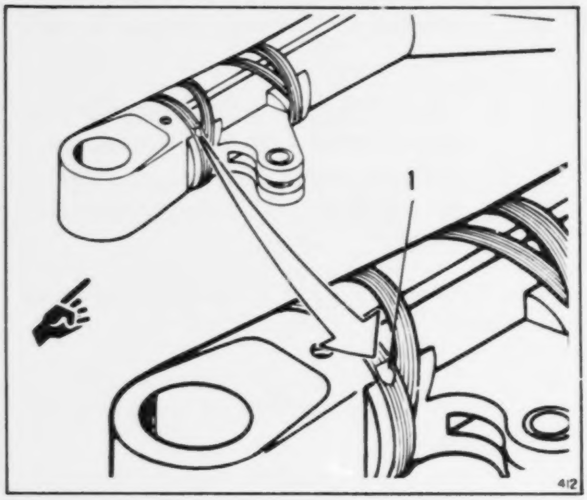
5-81.2 REPAIR KEVLAR SHOCK ABSORBER BRACKET WINDINGS — MINOR DAMAGE (Continued) 5-81.2



WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. **Wipe damage area (1) clean.** Use cloth (E120) damp with acetone (E20). Wear gloves (E186). Wipe dry with clean cloth before acetone evaporates.

INSPECT

WARNING

Adhesive (E40 or E41) is toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41, E43, or E47.1) only if prepackaged kit is not available.

4. **Mix tube of adhesive (E40).** Follow instructions on kit.
5. If adhesive (E40) is not available, prepare adhesive (E41) as follows:
    a. Weigh 100 parts of resin and 23 parts of hardener. Use trip balance.
    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

NOTE

Working life of adhesive is 30 minutes.

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5-81.2 REPAIR KEVLAR SHOCK ABSORBER BRACKET WINDINGS — MINOR DAMAGE (Continued) 5-81.2

5.1 If adhesive (E43) is used, prepare as follows:

  a. Weigh 7 parts of gray hardener and 5 parts of white base. Use trip balance.

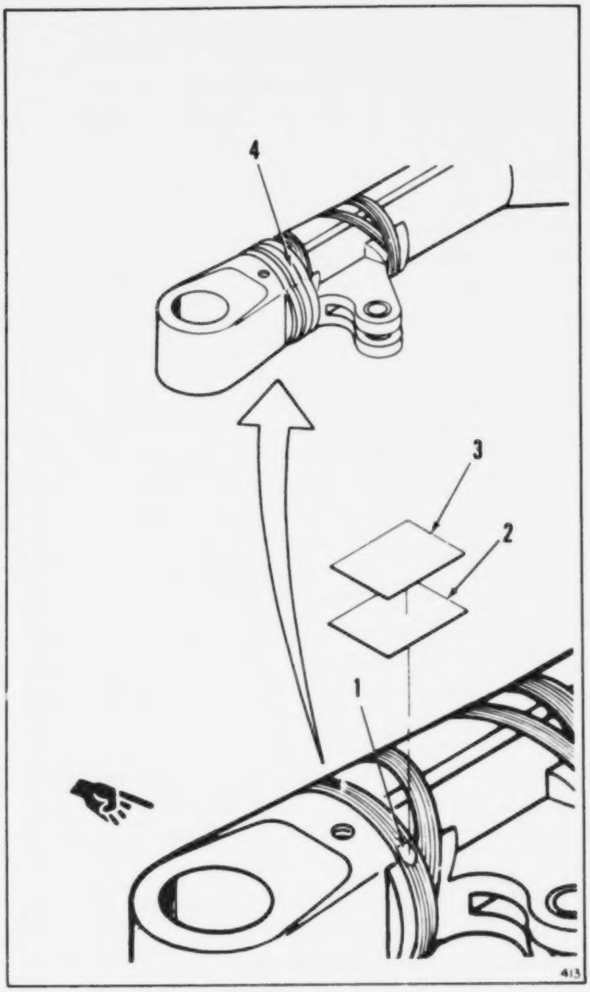
  b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

5.2 If adhesive (E47.1) is used, prepare as follows:

  a. Weight equal parts of adhesive (E47.1) and curing agent (E158.1). Use trip balance.

  b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

6. **Fill damage area (1) with adhesive (E40, E41, E43 or E47.1).** Smooth adhesive until it is level with surface. Make sure all loose fibers are turned into repair area.
7. **Cover damage area (1) with peel ply (E270) (2)** 1 inch larger, on all sides, than damage area.
8. **Cover peel ply (E270) (2) with teflon impregnated fabric (E170) (3)** of the same size.
9. **Secure peel ply (E270) (2) and teflon impregnated fabric (E170) (3).** Use tape (E387) (4).



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5-81.2 REPAIR KEVLAR SHOCK ABSORBER BRACKET WINDINGS — MINOR DAMAGE (Continued) 5-81.2

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.

10. Cure adhesive at 150 - 160°F (66 - 71°C) 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70 - 80°F (21 - 27°C) in 24 hours. Pressure may be removed after 12 hours.

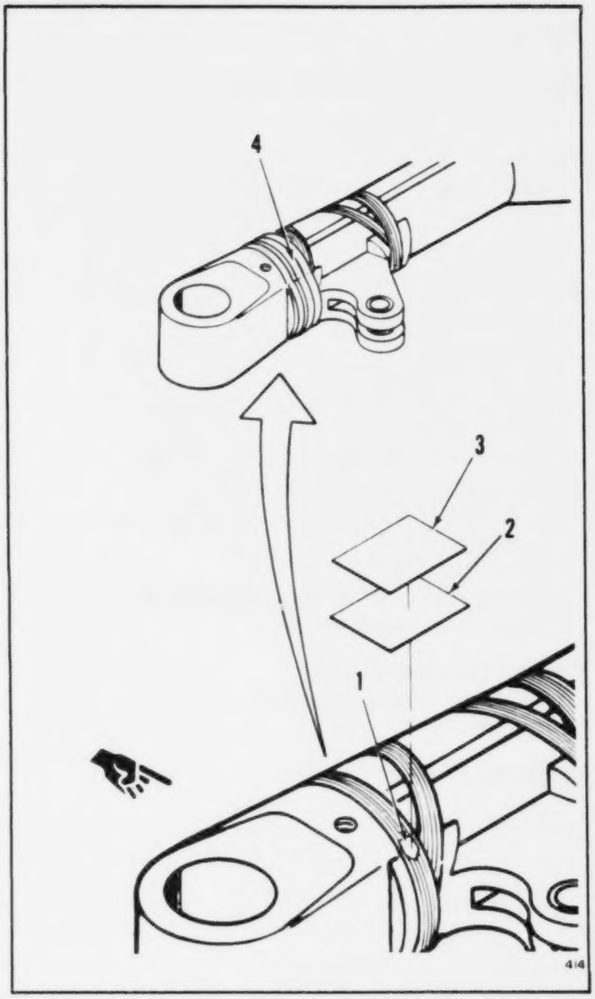
11. **Remove tape (4), teflon impregnated fabric (3), and peel ply (2).**

WARNING

Do not sand adhesive without wearing respirator. Harmful particles can be inhaled.

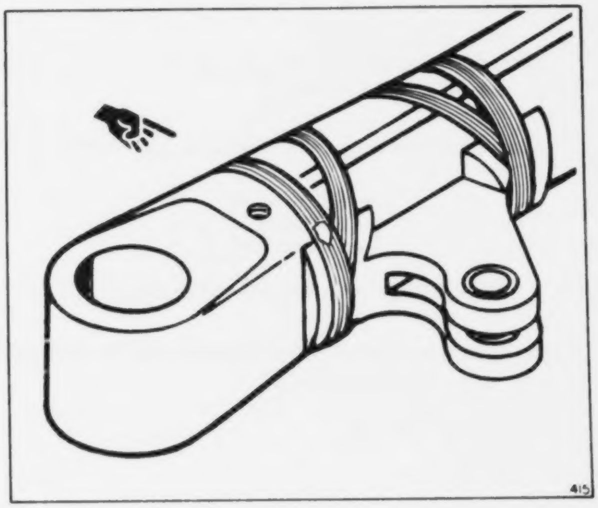
12. **Blend repair (1)** into area around it. Use abrasive paper (E9). Wear respirator.

INSPECT



FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).



5-81.2.1 REPAIR KEVLAR SHOCK ABSORBER BRACKET WINDING FILLER MATERIAL-CRACKS/VOIDS 5-81.2.1

INITIAL SETUP

Applicable Configurations:
All

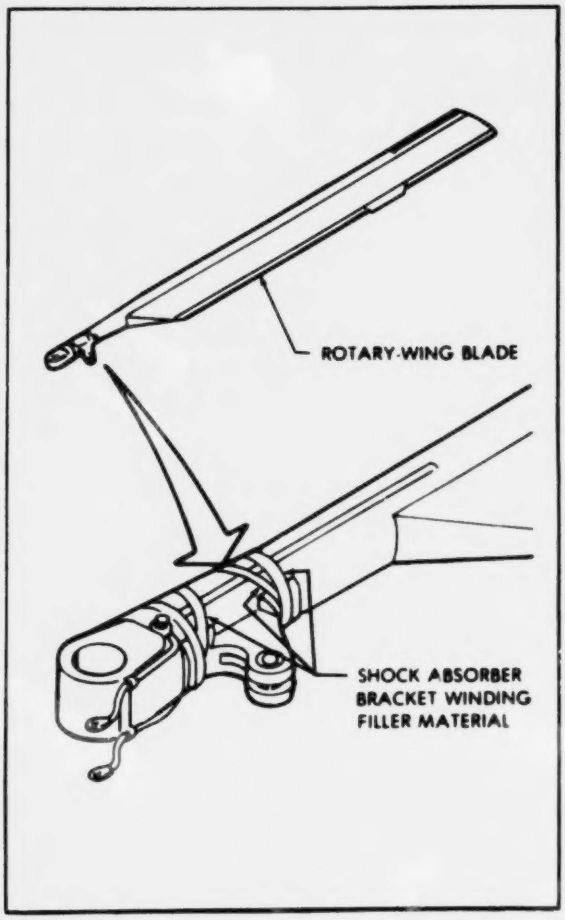
Tools:
Heat Lamp
Respirator
Trip Balance

Materials:
Abrasive Paper (E7)
Acetone (E20)
Adhesive (E40 or E41)
Curing Agent (E158.1)
Gloves (E186)
Hypodermic Syringe (E380)
Polyethylene Cup (E157)
Resin (E313.1)
Sealant (E342.1)
Teflon Tape (E399)
Temperature Indicating Strips (E413)
Tongue Depressor (E424)

Personnel Required:
Aircraft Structure Repairer
Inspector

Equipment Condition:

Off Helicopter Task



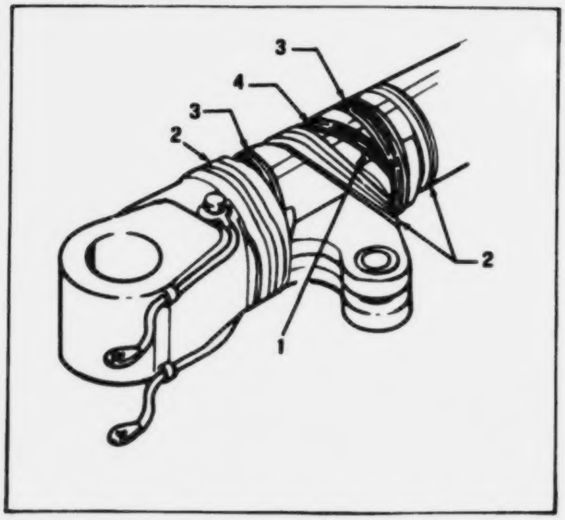
1. **Mask bracket** to within 0.50 inch of cracks or voids (1). Use teflon tape (E399) (2).

2. **Mask over windings (3).** Use teflon tape (E399) (2).

CAUTION

Do not sand into filament windings.

3. **Remove paint from filler material (4)** in damaged area. Use abrasive paper (E7).



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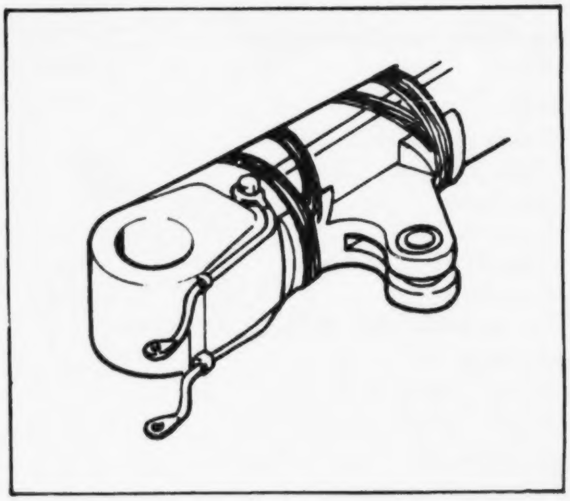
5-81.2.1 REPAIR KEVLAR SHOCK ABSORBER BRACKET WINDING FILLER MATERIAL-CRACKS/VOIDS (Continued) 5-81.2.1



NOTE

Working life of adhesive is 30 minutes.

CAUTION

Do not exceed 180°F (82°C) at blade surface. Damage to fiberglass can occur.

c. Cure adhesive at 150 - 160°F (66 - 71°C) 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70 - 80°F (21 - 27°C) in 24 hours.

d. **Apply sealant (E342.1)** over void filled area as in step 5.

9. Remove teflon tape (E399) from around repair and filament windings.

FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).

END OF TASK

5-81.3 REPAIR LIGHTNING PROTECTION STRIP UNBONDING 5-81.3

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
Heat Lamp
Scissors
Shim, 0.005-Inch Thick
Shot Bags
Trip Balance, NSN 6670-00-401-7195

Materials:

Abrasive Paper (E9)
Acetone (E20)
Adhesive (E40, E41 or E47.1)
Aluminum Foil (E66)
Chalk (E111)
Cloth (E120)
Gloves (E186)
Naphtha, Aliphatic (E245)
Peel Ply (E270)
Polyethylene Cup (E157)
Rubber, 1/4-Inch Thick (E321)
Squeeze Bottle (E366)
Teflon Tape (E399)
Temperature Indicating Strips (E413)
Wood Spatula (E424)
Curing Agent (E158.1)

Personnel Required:

Aircraft Structural Repairer
Medium Helicopter Repairer (3)
Inspector

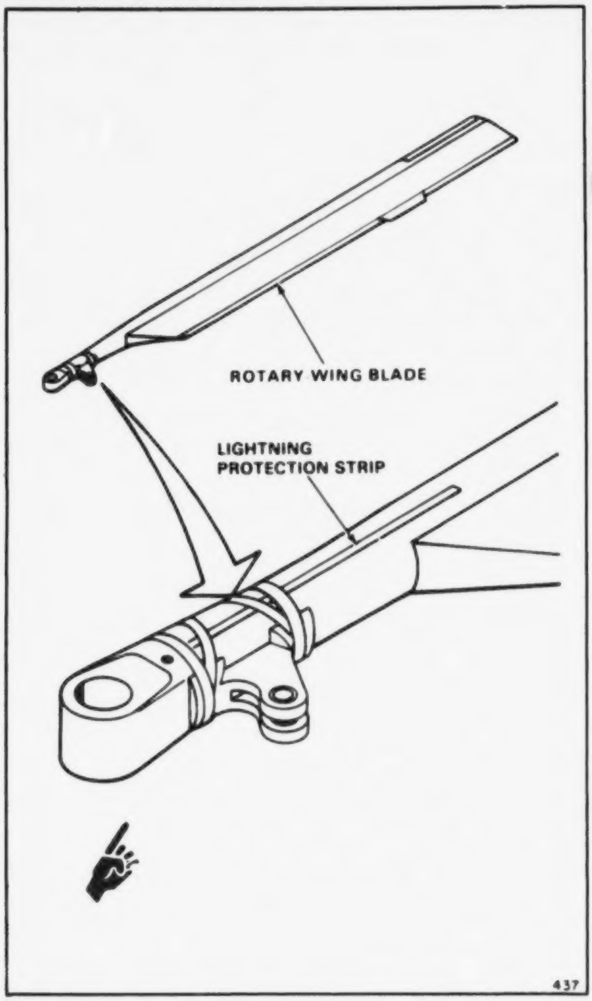
Equipment Condition:

Off Helicopter Task

General Safety Instructions:

WARNING

Adhesive (E40, E41, E47.1) is toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



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5-81.3 REPAIR LIGHTNING PROTECTION STRIP UNBONDING (Continued) 5-81.3

1. **Find size of unbonded area (1).** Use shim 0.005-inch thick. Outline unbonded area. Use chalk (E111). Voids that do not reach edge require no repair.
2. **Remove adhesive fairing (6) next to unbonded area (1).** Use utility knife.
3. **Apply teflon tape (E399) (2)** to lightning protection strip (3) in unbonded area (1).
4. **Cut aluminum foil (E366) (4)** to outline shape of unbonded area (1). **Secure foil** with teflon tape (E399) (5).
5. **Open unbonded area (1).** Use shim 0.005-inch thick.
6. Have helpers **position blade (7) so unbonded area (1) is lower than lightning protection strip (3).**

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

7. **Flush unbonded area (1)** with acetone (E20) until acetone runs clear. Use squeeze bottle (E366). Wear gloves (E186). Allow to dry for 15 minutes.

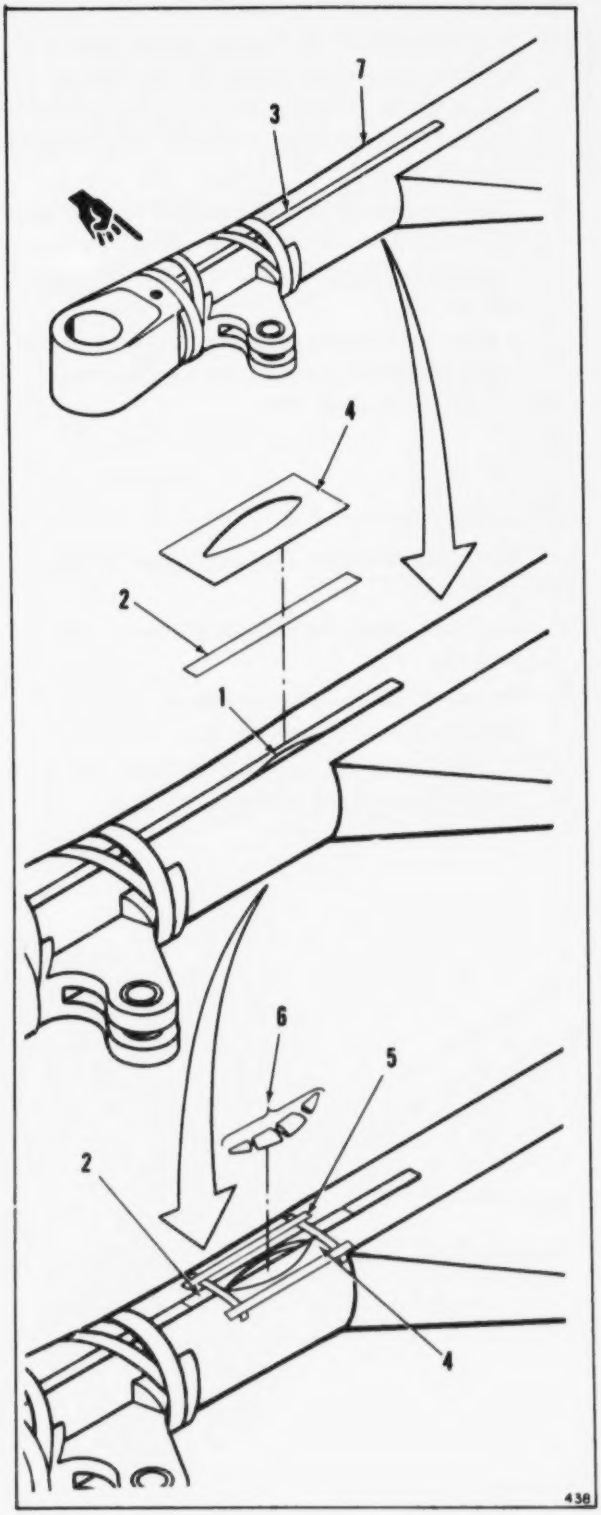
NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41 or E47.1) only if prepackaged kit is not available.

8. **Mix tube of adhesive (E40).** Follow instructions on kit.
9. If adhesive (E40) is not available, prepare adhesive (E41) as follows:
   a. Weigh 100 parts of resin and 23 parts of hardener. Use trip balance.
   b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

NOTE

Working life of adhesive is 30 minutes .



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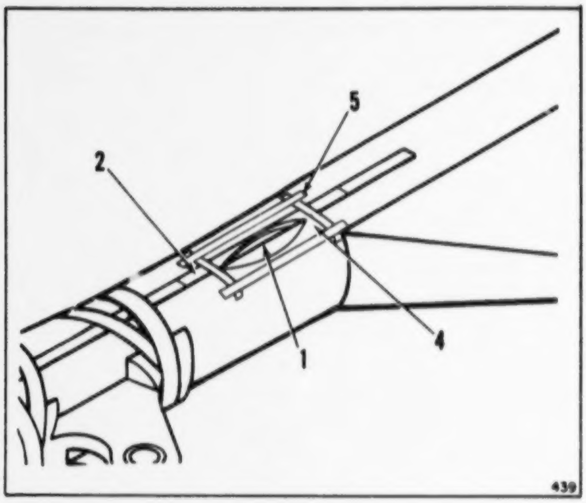
5-81.3 REPAIR LIGHTNING PROTECTION STRIP UNBONDING (Continued) 5-81.3

9.1 If adhesive (E47.1) is used, weigh equal amounts of adhesive (E47.1) and curing agent (E158.1). Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

10. **Apply adhesive (E40 or E41)** to unbonded area (1). Use shim 0.005-inch thick to push adhesive until unbonded area is completely filled.

11. **Close unbonded area (1) by hand pressure.** Wipe off excess adhesive (E40 or E41). Use cloth (E120).

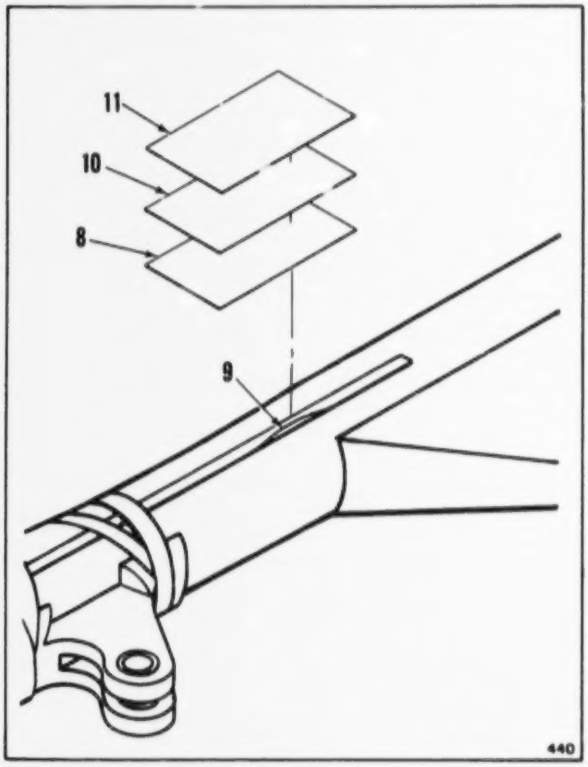


12. **Remove foil (E66) (4) and tape (E399) (2 and 5).**

13. **Position peel ply (E270) (8)** over repair area (9).

14. **Position teflon-impregnated fabric (E170) (10)** over peel ply (E270) (8).

15. **Position rubber pad (E321) (11)** over teflon-impregnated fabric (E170) (10).



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5-81.3 REPAIR LIGHTNING PROTECTION STRIP UNBONDING (Continued) 5-81.3

16. **Position shot bag, or bags (12)** as required, over rubber pad (E321) (11).

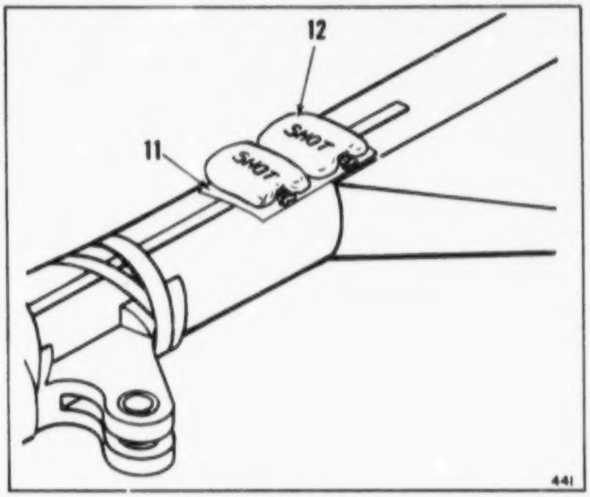
CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.

17. Cure adhesive at 140 - 160°F (60 - 71°C) for 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413)

NOTE

Serviceable cure can be achieved without heat at 70 - 80°F (21 - 27°C) in 24 hours. Pressure may be removed after 12 hours.



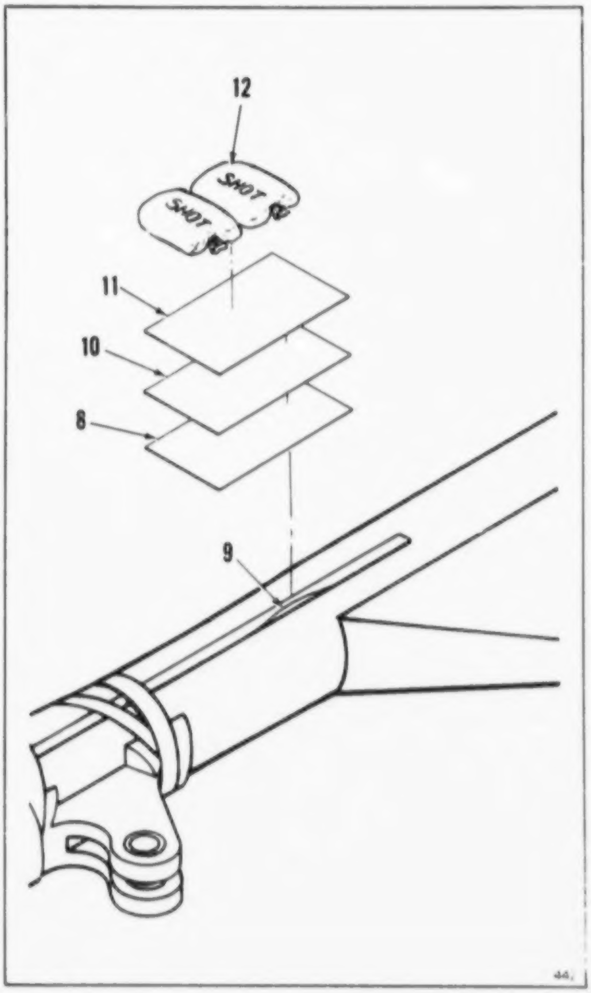
18. **Remove shot bags (12), rubber pad (11), teflon-impregnated fabric (10), and peel ply (8).**

19. Remove excess adhesive from repair area (9). Use abrasive paper (E9).

WARNING

Naphtha (E245) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

20. **Wipe repaired area (9).** Use cloth (E120) damp with naphtha (E245). Wipe dry with clean cloth before naphtha evaporates.



INSPECT

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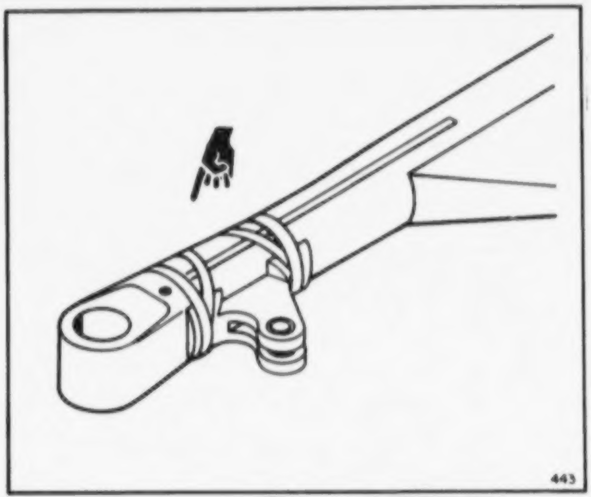
5-81.3 REPAIR LIGHTNING PROTECTION STRIP UNBONDING (Continued) 5-81.3

FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).



END OF TASK

5-81.3.1 REPLACE LIGHTNING PROTECTION JUMPER STRIP 5-81.3.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Airframe Repairer's Tool Kit,
NSN 5180-00-323-4876
Heat Lamp
Vacuum Pump

Materials:

Abrasive Paper (E9)
Acetone (E20)
Cloth (E120)
Fiberglass Laminate (E168 or E168.1)
Scrim Cloth (E325)
Adhesive (E40, E41, E43 or E47.1)
Polyethylene Cup (E157)
Wood Spatula (E424)
Peel Ply (E270)
Teflon Impregnated Fabric (E170)
Rubber Sheet (E318)
Fiberglass Cloth (E130)
Masking Tape (E388)
Sealing Tape (E396)
Teflon Tape (E399)
Polyvinyl Sheet (E284)
Temperature Indicating Strips (E413)
Gloves (E186)
Curing Agent (E158.1)

Parts:

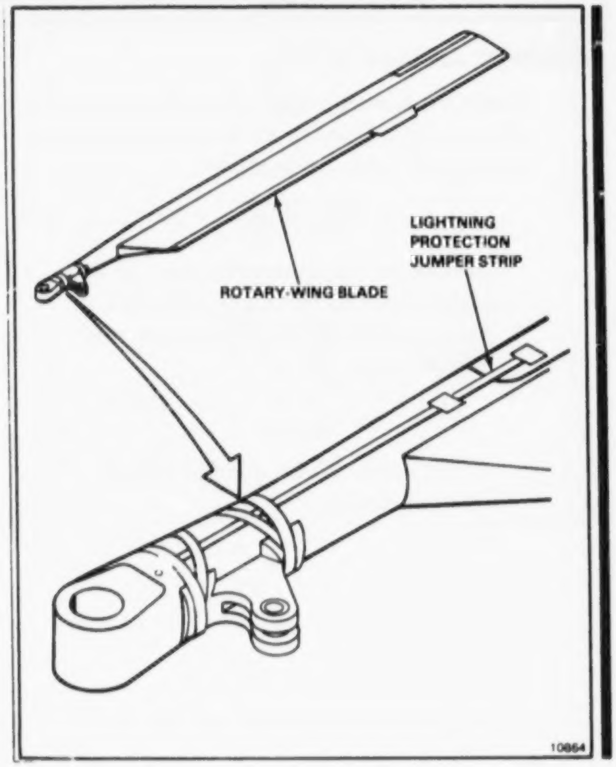
Jumper Strip 114R1750-12
Doubler 114R1702-24

Personnel Required:

Aircraft Structural Repairer
Inspector

Equipment Condition:

Off Helicopter Task



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5-81.3.1 REPLACE LIGHTNING PROTECTION JUMPER STRIP (Continued) 5-81.3.1

REMOVE JUMPER STRIP

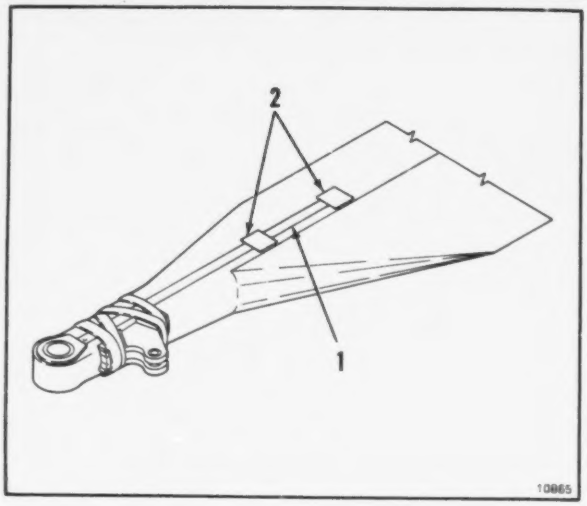
1. **Remove jumper strip (1)** and doublers (2). Use a pocket knife to lift a corner and pliers to peel off strip and doublers.

CAUTION

To ensure proper adhesion of replacement jumper strip do not remove all adhesive residue and primer.

NOTE

A heat lamp can be used to soften adhesive bond.



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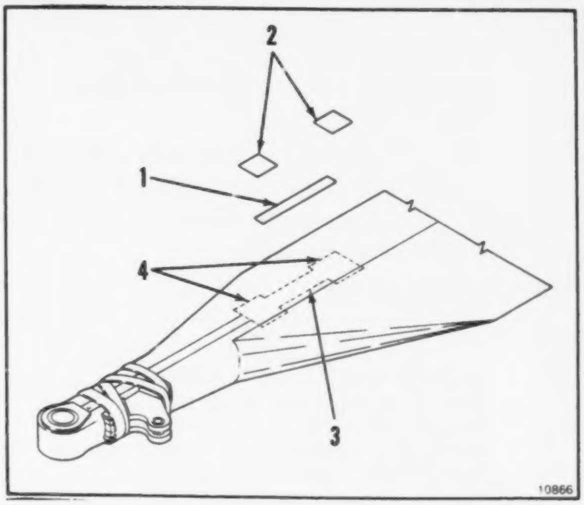
5-81.3.1 REPLACE LIGHTNING PROTECTION JUMPER STRIP (Continued) 5-81.3.1



2. **Remove loose scrim cloth and adhesive** from jumper strip bond area (3). Use abrasive paper (E9). Finish removal shall extend 1/2 inch forward and aft of bond area.
3. **Remove finish** from an area (4) 5 inches by 5 inches centered over both ends of jumper strip location (3). Use abrasive paper (E9).

PREPARE FOR INSTALLATION

4. If new doublers (2) are not available, cut two pieces of fiberglass laminate (E168 or E168.1) 4 inches by 4 inches square. Round corners to a 1/4 inch radius.

NOTE

Jumper replacement requires installation of doublers at each end.

5. Sand both sides of doublers (2) to remove surface glaze. If fiberglass laminate (E168.1) or replacement doublers are used, remove peel ply protective covering from each side before sanding.

NOTE

Do not sand jumper strip. It is preprimed for bonding.

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

6. **Wipe bonding surfaces** of blade, jumper strip (1), and doublers (2). Use clean cloth (E120) damp with acetone (E20). Wipe dry with clean cloth (E120) before acetone evaporates.

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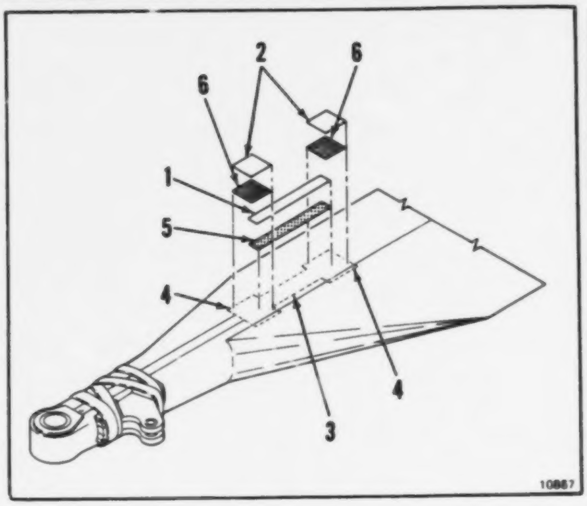
5-81.3.1 REPLACE LIGHTNING PROTECTION JUMPER STRIP (Continued) 5-81.3.1

NOTE

If adhesive (E40 or E41) is available, scrim cloth is not required, but can be used if desired.

7. If adhesive (E43 or E47.1) is to be used, cut three pieces of scrim cloth (E325) (5 and 6) 1/4 inch shorter and narrower than jumper strip (1) and doublers (2).



PREPARE ADHESIVE

WARNING

Adhesive (E40, E41, E43 or E47.1) is flammable and toxic. Avoid inhaling. Use only with adequate ventilation. Keep away from heat, sparks, or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41) only if prepackaged kit is not available.

8. **Mix tube of adhesive (E40).** Follow instructions on kit.
9. If adhesive (E40) is not available, prepare adhesive (E41) as follows:
    a. Weigh 100 parts of resin and 23 parts of hardener. Use trip balance.
    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).
10. If adhesive (E43) is used, prepare as follows:
    a. Weigh 7 parts of gray hardener and 5 parts of white base. Use trip balance.
    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).
11. If adhesive (E47.1) is used, prepare as follows:
    a. Weigh equal parts of adhesive (E47.1) and curing agent (E158.1). Use trip balance.
    b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

GO TO NEXT PAGE

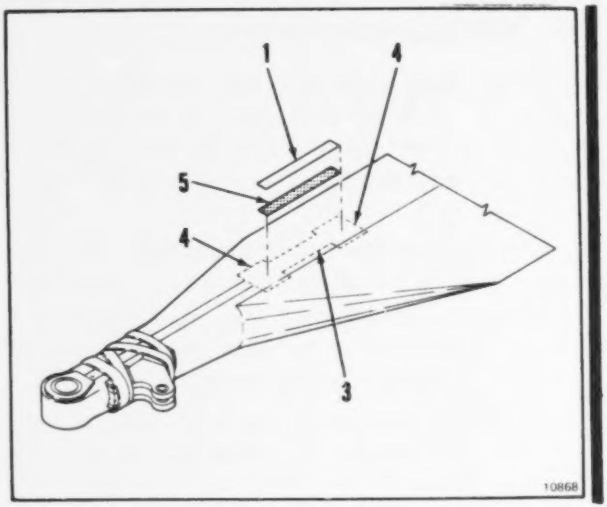
5-81.3.1 REPLACE LIGHTNING PROTECTION JUMPER STRIP (Continued) 5-81.3.1

INSTALL JUMPER STRIP

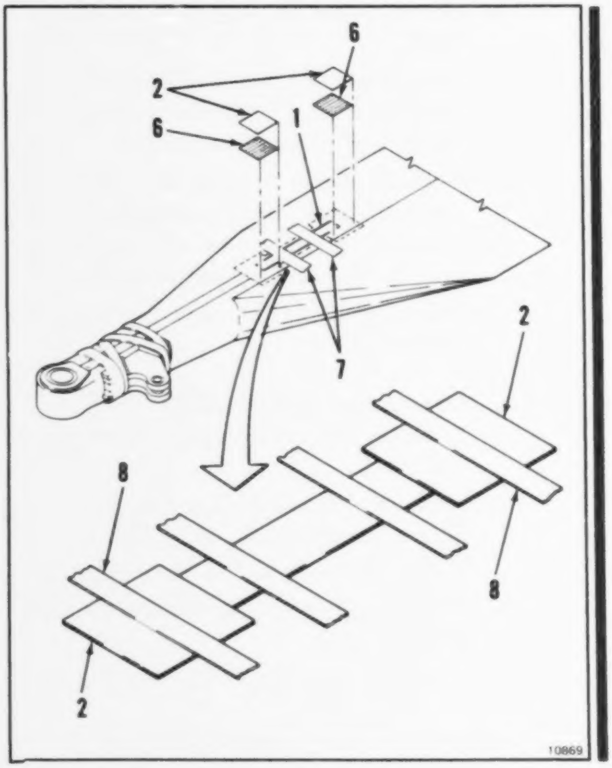
NOTE

Working life of adhesive (E40, E41, E43 or E47.1) is about 30 minutes.

12. **Apply adhesive** (E40, E41, E43 or E47.1) to the jumper strip bond area (3) and jumper strip (1).
13. If needed, place scrim cloth (E325) (5) on adhesive coated jumper strip (1). Tamp cloth in place to remove air bubbles and wrinkles.



14. **Place jumper strip (1) on jumper strip bond area (3).** Hold in place with two pieces of teflon tape (E399) (7). Apply adhesive to ends of jumper strip where doublers (2) will overlap.
15. **Apply adhesive to doublers** (2). If needed, place scrim cloth (6) on doublers (2). Tamp in place to remove air bubbles and wrinkles.
16. **Center doublers (2)** over ends of jumper strip (1). Secure with teflon tape (E399) (8).



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5-81.3.1 REPLACE LIGHTNING PROTECTION JUMPER STRIP (Continued) 5-81.3.1

17. **Bond repair as follows:**

    a. Cover repair with layer of peel ply (E270) (9) and layer of teflon-impregnated fabric (E170) (10). Make layers large enough to overlap patch (22) 1-inch.

    b. Cover teflon-impregnated fabric (E170) (10). Use thick rubber pad (E318) (11).

    c. Cover repair area with fiberglass cloth (E132) (12). Cut cloth large enough to cover rubber pad (318) (11).

    d. Surround cloth (E132) (12) with sealing tape (E396) (13). Keep tape clear of cloth.

    e. Attach tube (14) to vacuum pump hose.

    f. Wrap tube (14) with two layers of fiberglass cloth (E132) (15). Apply masking tape (E388) over cloth.

    g. Position tube (14) on cloth (E132) (12) covering repair. Wrap tube with sealing tape (E396) (16) where tube crosses sealing tape (13) already applied.

    h. Press tube (14) onto tape (13) to make airtight seal.

    i. Press polyvinyl sheet (E284) (17) smoothly onto tape (13) to make airtight seal.

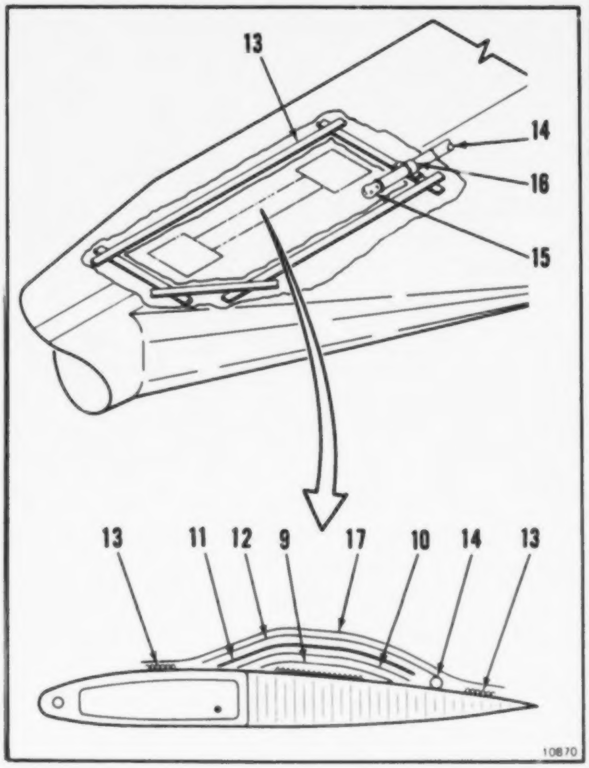
    j. Start vacuum pump. Check for leaks. Reposition polyvinyl sheet (E284) (17) or add tape (E396) (13) as needed.

    k. Maintain 20-inches Hg vacuum through adhesive cure.

CAUTION

Do not exceed 160°F (71°C) at blade surface. Damage to fiberglass can occur.

    l. Cure adhesive at 150 - 160°F (66 - 71°C) for 2 hours. Use heat lamp. Monitor temperature. Use temperature indicating strips (E413).



NOTE

Serviceable cure can be achieved without heat at 70 - 80°F (21 - 27°C) in 24 hours. Vacuum may be removed after 12 hours.

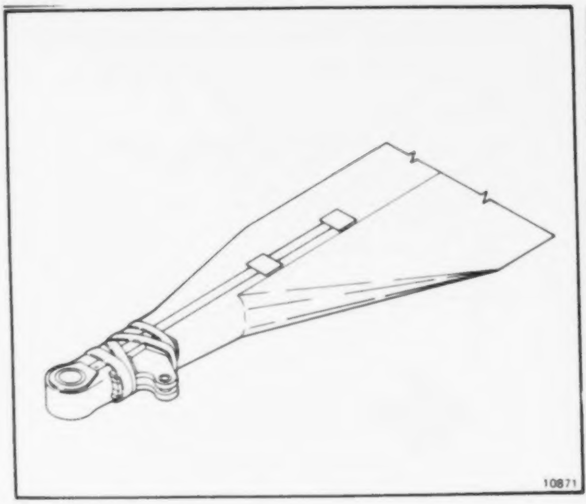
    m. Turn off vacuum pump.

    n. Remove peel ply (9) fabric (10), rubber (11), fiberglass (12), tape (13), tube (14), and sheet (17).

GO TO NEXT PAGE

5-81.3.1 REPLACE LIGHTNING PROTECTION JUMPER STRIP (Continued) 5-81.3.1

18. **Fair adhesive squeezeout** to surrounding blade surface. Use abrasive paper (E9). If fairing was not achieved by squeezeout, mix additional adhesive (E40, E41, E43 or E47.1) as directed in steps 8, 9, 10, or 11.



FOLLOW-ON MAINTENANCE:

Refinish repair area (Task 5-82).

END OF TASK

5-81.4 WIRE MESH CORROSION REPAIR 5-81.4

INITIAL SETUP

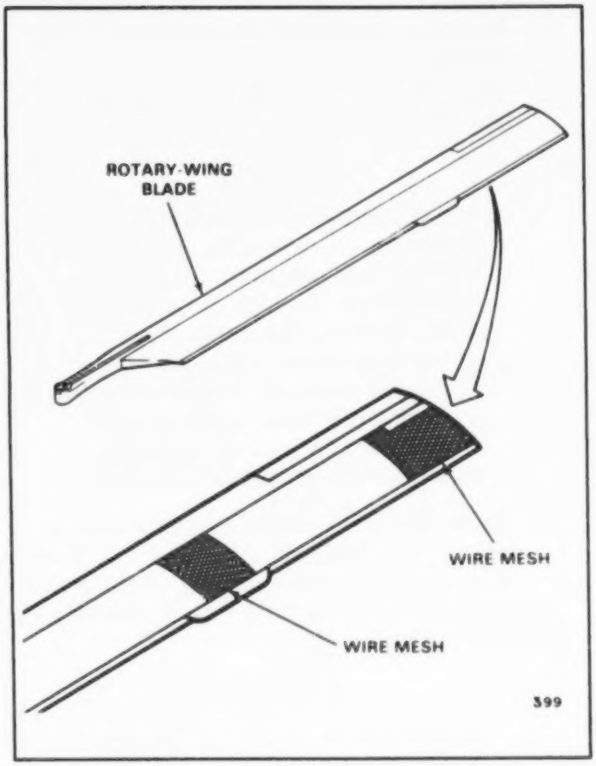
Applicable Configurations:
All

Tools:
Brush

Materials:
Abrasive Mats (E3)
Acetone (E20)
Antistatic Coating (E135.1)
Cloth (E120)
Gloves (E186)
Epoxy Primer (E292)

Personnel Required:
Aircraft Structural Repairer
Inspector

Equipment Condition:
Off Helicopter Task


ROTARY-WING BLADE
WIRE MESH
WIRE MESH
399

GO TO NEXT PAGE

1. **Remove corrosion from mesh (1).** Use abrasive mats (E3).
2. **Brush loose material from mesh (1).** Use dry cloth (E120).

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. **Clean mesh (1)** where corrosion was removed. Use cloth damp with acetone (E20). Wipe until cloth remains clean. Wipe dry immediately. Use dry cloth (E120). Allow to dry for 15 minutes.

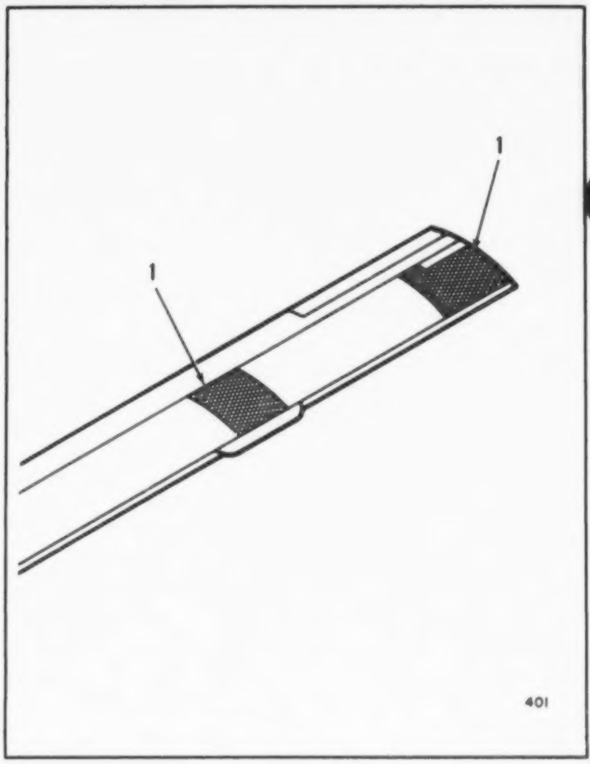
WARNING

Epoxy primer (E292) is flammable and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from heat or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

4. **Apply mist coat of epoxy primer (E292).** Air dry 1 hour.
5. (Deleted)

WARNING

Antistatic coating (E135.1) is flammable and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from heat or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



6. **Apply antistatic coating (E135.1)** as follows:
   a. Mix coating. Follow instructions on container.
   b. Apply heavy layer of coating to repaired mesh (1). Use brush.
   c. Allow coating to dry for 2 hours.

INSPECT

FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).

END OF TASK

5-81.5 REPAIR SHOCK ABSORBER BRACKET MINOR DAMAGE 5-81.5

INITIAL SETUP

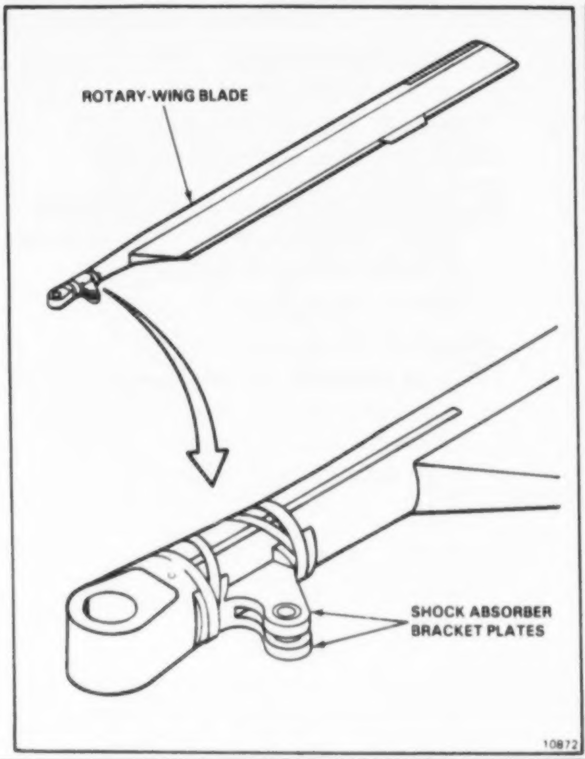
Applicable Configurations:
All

Tools:
Aircraft Repairer's Tool Kit,
NSN 5180-00-323-4876

Materials:
Acetone (E20)
Abrasive Paper (E7 and E9)
Cloth (E120)
Gloves (E186)

Personnel Required:
Aircraft Structure Repairer
Inspector

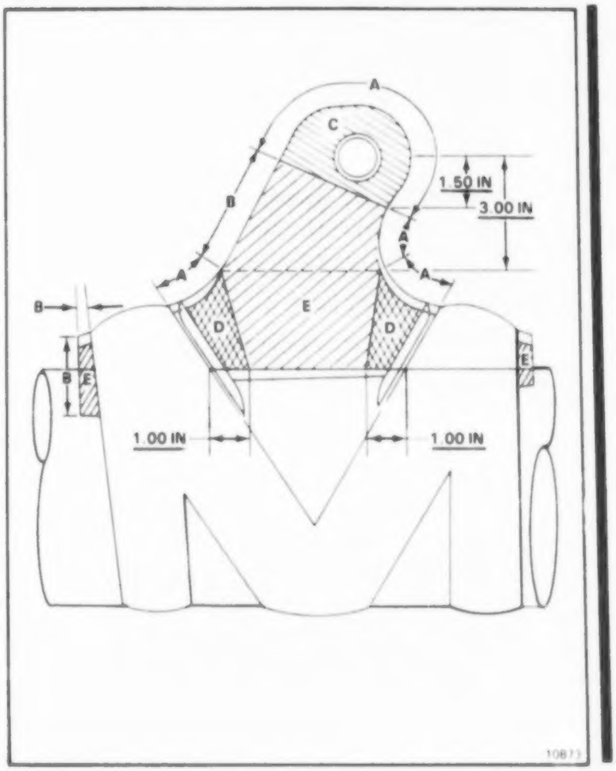
Equipment Condition:
Off Helicopter Task


ROTARY-WING BLADE
SHOCK ABSORBER BRACKET PLATES
10872

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. **Remove finish** from damaged area. Use cloths damp with acetone (E20).
2. **Check depth of damage** and identify repair area (A thru E). Reject the blade if damage exceeds the following limits:


A
C
1.50 IN
3.00 IN
B
A
A
A
B
E
D
D
B
E
E
1.00 IN
1.00 IN
10873

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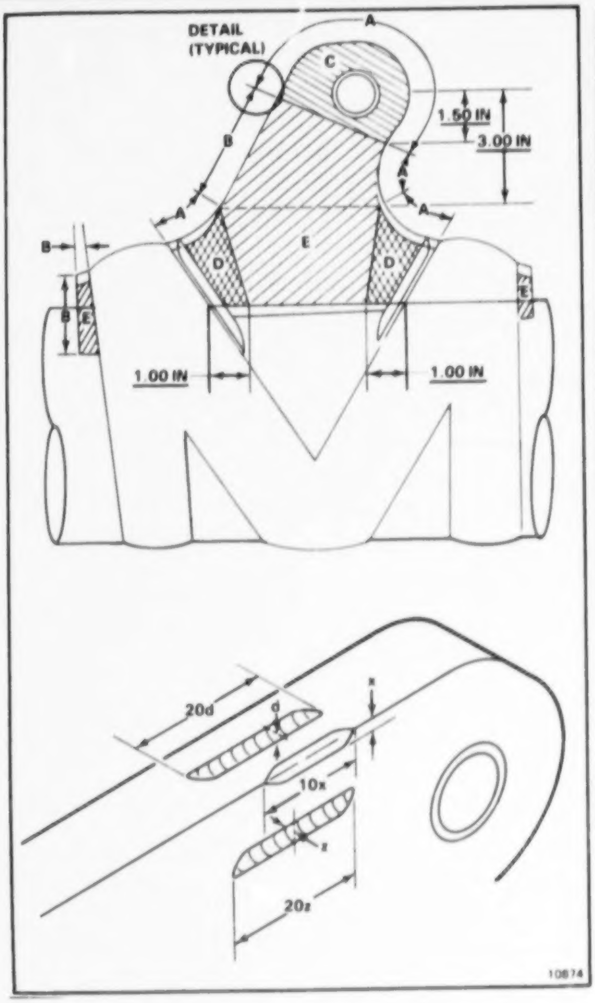
5-81.5 REPAIR SHOCK ABSORBER BRACKET MINOR DAMAGE (Continued) 5-81.5



a. **Edge Damage (1).** Depth (d) of dents or scores shall not exceed:

   Area A 0.02 inch

   Area B 0.04 inch

b. **Corner Damage (2).** Maximum chamfer (X) required to remove corner dents or delaminations shall not exceed:

   Area A 0.10 inch

   Area B 0.15 inch

c. **Face Damage (3).** Maximum depth (Z) and rework area of dents, scores or delamination of top or bottom surface must not exceed the following:

   Area C 0.02 inch, 0.25 sq. in.

   Area D 0.02 inch, 0.50 sq. in.

   Area E 0.04 inch, 2.00 sq. in.

NOTE

The maximum depth and area is for the total of both faces of each plate.

3. **Remove edge damage (1)** by sanding or grinding. Blend reworked area over a length 20 times depth (d).
4. **Remove corner damage (2)** by sanding or grinding. Blend chamfer to a length 10 times depth (X).
5. **Remove face damage (3)** by sanding or grinding. Blend reworked area over a length 20 times depth of damage (Z).

FOLLOW-ON MAINTENANCE:

Refinish repair area (Task 5-82).

END OF TASK

5-81.6 PREPARE ADHESIVES 5-81.6

INITIAL SETUP

Applicable Configurations:
All

Tools:
Trip Balance, NSN 6670-00-401-7195

Materials:
Gloves (E186)
Polyethylene Cup (E157)
Wood Spatula (E424)

Personnel Required:
Aircraft Structure Repairer

General Safety Instructions:

WARNING

Adhesives (E27, E40, E41, and E47.1) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

ADHESIVE EA9309.3NA (E40 OR 41)

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41) only if prepackaged kit is not available.

1. Mix tube of adhesive (E40) according to instructions on kit.
2. Prepare adhesive (E41) as follows:
   a. Weigh **100 parts** of resin part A (pink paste) and **23 parts** of hardener part B (blue liquid). Use trip balance.
   b. Mix parts in polyethylene cup (E157) until color is uniform dark pink. Use wood spatula (E454).

NOTE

Working life of adhesive (E40 or E41) is 30 minutes. Adhesive cures in 2 hours at 150°F to 160°F (66°C to 71°C). A serviceable cure can be achieved at 70°F to 80°F (21°C to 27°C) in 24 hours. Pressure may be removed after 12 hours.

ADHESIVE EC-2216 (E27)

3. Weigh 7 parts of part A hardener (gray paste) and 5 parts of part B base (cream paste). Use trip balance.
4. Mix parts in polyethylene cup (E157) until color is uniform medium gray. Use wood spatula (E454).

NOTE

Working life of adhesive (E27) is 1 to 2 hours. Adhesive cures in 2 hours at 150°F to 160°F (66°C to 71°C). A serviceable cure can be achieved at 70°F to 80°F (21°C to 27°C) in 24 hours. Pressure may be removed after 12 hours.

ADHESIVE EPON 828 (E47.1) AND HARDENER VERSAMID 125 (E194.1)

5. Weigh 10 parts of adhesive (light amber resin) and 1 part hardener (dark amber resin). Use trip balance.
6. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E454).

NOTE

Working life of adhesive mix (E47.1 and E194.1) is 1 hour. Adhesive cures in 2 hours at 150°F to 160°F (66°C to 71°C). A serviceable cure can be achieved at 70°F to 80°F (21°C to 27°C) in 24 hours. Pressure may be removed after 12 hours.

FOLLOW-ON MAINTENANCE:

As required

END OF TASK

5-82 REFINISHING ROTARY-WING BLADE 5-82

INITIAL SETUP

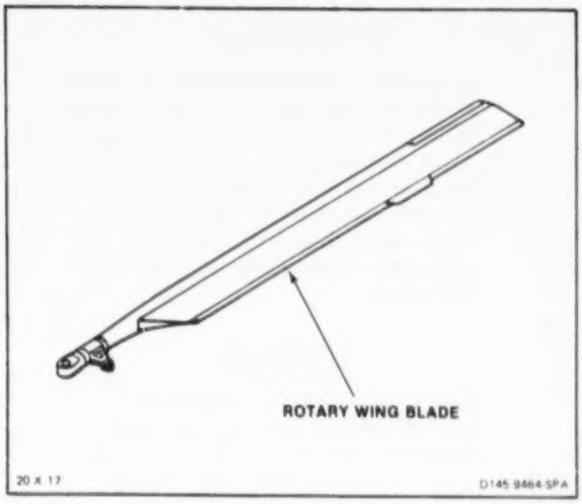
Applicable Configurations:
All

Tools:
Sanding Block

Materials:
Gloves (E186)
Abrasive Paper (E7)
Acetone (E20)
Abrasive Paper (E9)
Aliphatic Naphtha (E245)
Cloth (E120)
Antistatic Coating (E135.1)
Black Lacquer (E215)
Thinner (E415)

Personnel Required:
Aircraft Structural Repairer
Inspector

Equipment Condition:
Off Helicopter Task



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1. **Remove finish around repaired area** of blade (1) as follows:

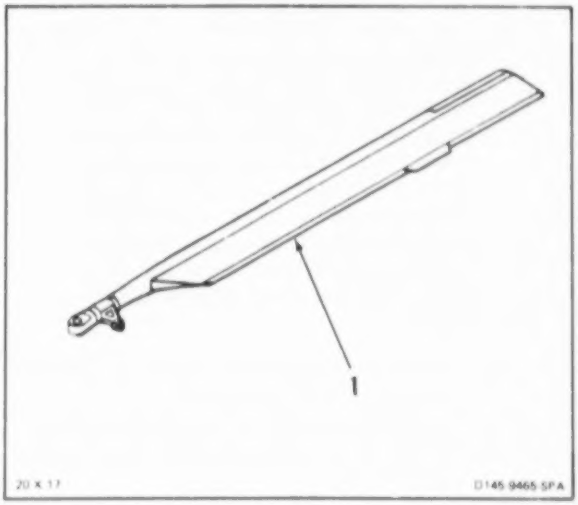
   a. Remove finish. Use sanding block and abrasive paper (E7).

   WARNING

   Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

   b. If finish requires softening, use acetone (E20). Wear gloves (E186).

   c. Complete finish removal. Use abrasive paper (E9).



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5-82 REFINISHING ROTARY-WING BLADE (Continued) 5-82

WARNING

Aliphatic naphtha (E245) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

CAUTION

Use only aliphatic naphtha (E245). Other grades can contaminate blade surface. Do not soak surface. Use only damp cloth (E120).

2. **Wipe area of blade (1)** to be refinished. Use cloths (E120) damp with naphtha (E245). Continue wiping until cloths remain clean. Wipe naphtha dry before it evaporates. Wear gloves (E186).
3. **Refinish repaired area** as follows:

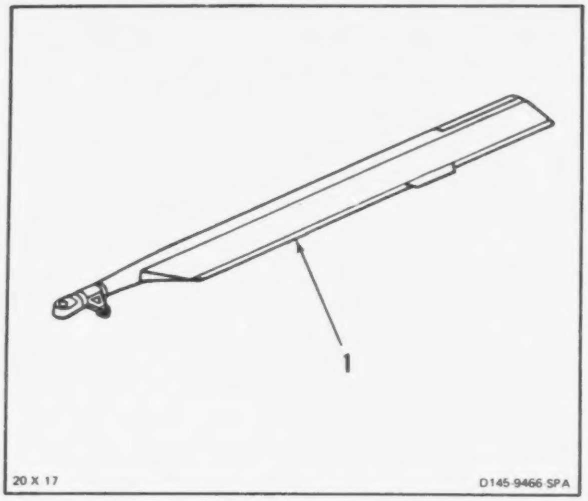
WARNING

Antistatic coating (E135.1) is flammable and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from heat or open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

   a. Mix antistatic coating (E135.1). Follow instructions on container.
   b. Brush heavy coat of antistatic coating (E135.1) on repaired area. Wear gloves (E186).

WARNING

Lacquer (E215) is extremely flammable. It can be toxic. Keep away from heat, sparks, or open flames. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



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WARNING

Thinner (E415) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

c. Thin black lacquer (E215). Use thinner (E415). Follow instructions on container.

d. Apply coat of thinned lacquer. Wear gloves (E186).

e. Allow lacquer to dry 45 minutes.

f. Apply second coat of thinned lacquer. Wear gloves (E186).

g. Allow lacquer to dry 45 minutes.

INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-82.1 ADJUST BLADE BALANCE WEIGHTS 5-82.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Ruler, 24-Inch

Torque Wrench, 100 to 750 Inch-Pounds

Materials:

Hardwood Dowel (Appx E-44)

Lockwire (E233)

Parts:

Overbalance Weight 114R1737

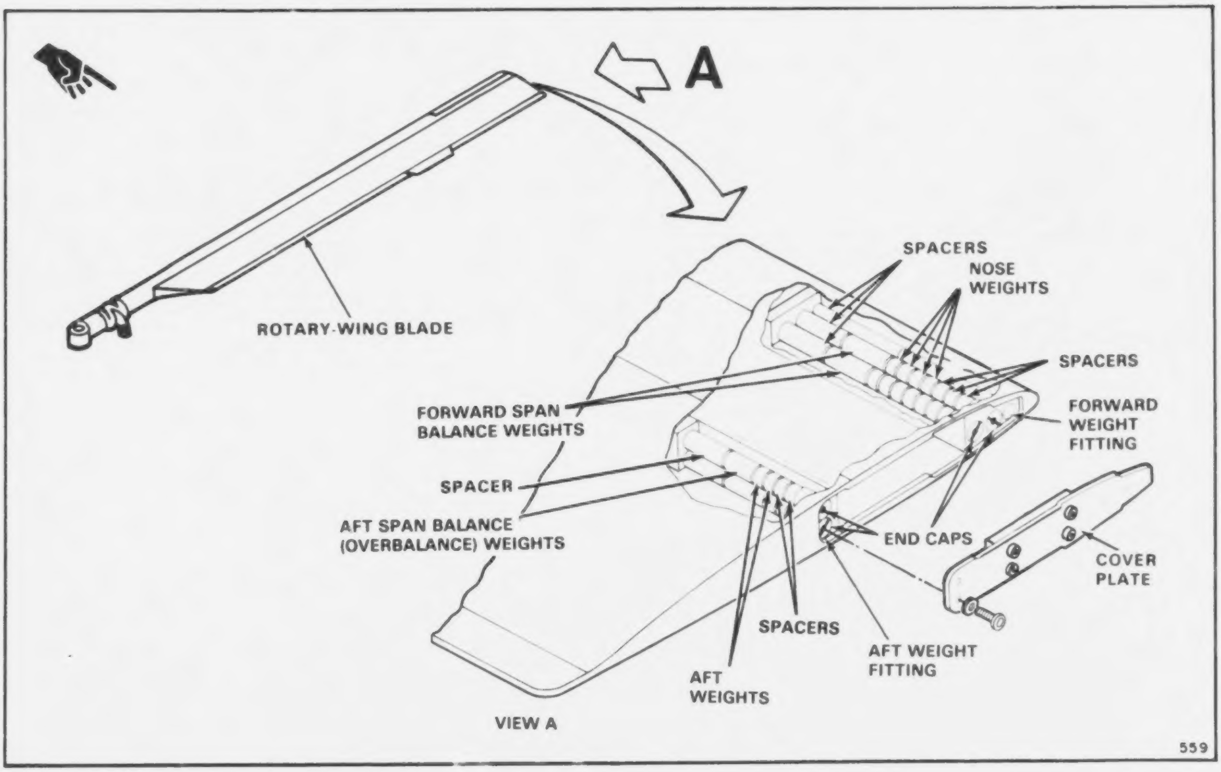
Personnel Required:

Medium Helicopter Repairer

Inspector

Equipment Condition:

Off Helicopter Task


A
ROTARY-WING BLADE
SPACERS
NOSE WEIGHTS
SPACERS
FORWARD SPAN BALANCE WEIGHTS
FORWARD WEIGHT FITTING
SPACER
AFT SPAN BALANCE (OVERBALANCE) WEIGHTS
END CAPS
COVER PLATE
SPACERS
AFT WEIGHT FITTING
AFT WEIGHTS
VIEW A
559

GO TO NEXT PAGE

5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

1. **Find the tracking weight adjustment required for the blade repair as follows:**

NOTE

Tracking weight adjustment is required following fairing skin and core repair, trailing edge major repair, nickel erosion cap replacement, and titanium nose cap crack repair.

   a. For fairing skin and core repair (Task 5-68, 5-69, 5-70, and 5-72.1), go to step 2.

   b. For trailing edge major repair (Task 5-72), go to step 3.

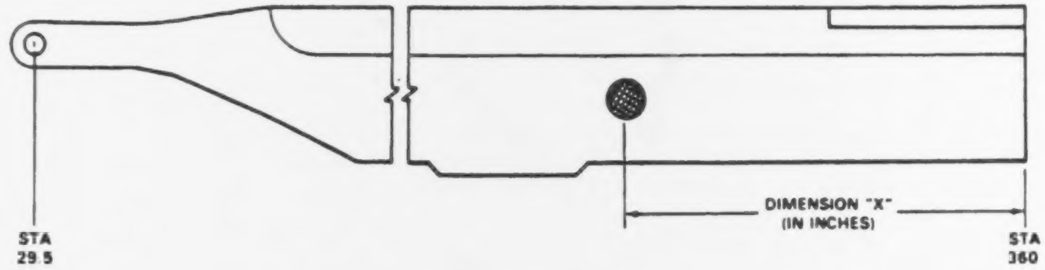
   c. For nickel erosion cap replacement (Task 5-66), go to step 4.

   d. For titanium nose cap crack repair (Task 5-66.2), go to step 5.

2. **Find balance and tracking weight adjustment for fairing skin and core repairs as follows:**

   a. Measure in inches distance "X" from tip of blade to center of repair. Record dimension "X".

   b. Subtract dimension "X" from 360 to find blade station. Record blade station.



NOTE: BLADE TIP IS STATION 360.
SUBTRACT DIMENSION "X" TO
FIND BLADE STATION OF REPAIR.

GO TO NEXT PAGE

5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

c. Find the span weight correction from chart 1 as follows:

   (1) Find blade station (step b) along bottom of chart.

   (2) Move upward to adhesive weight recorded for repair (Task 5-68, 5-69, or 5-70).

   (3) From intersection of blade station and adhesive weight, move across to left and right sides of chart 1.

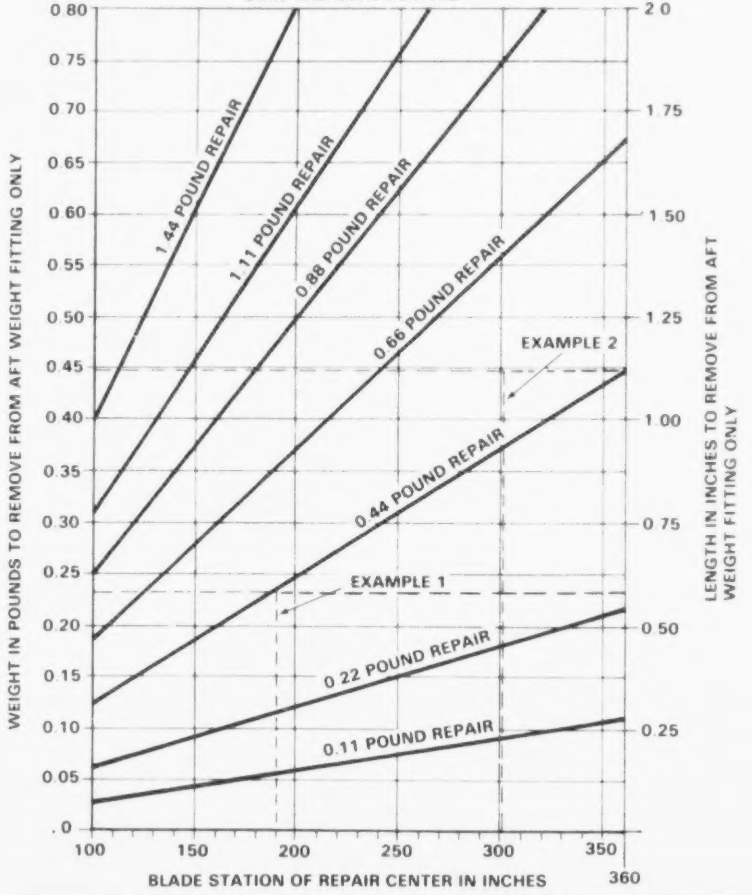
      (a) On left side, record weight in pounds to remove from aft weight fitting.

      (b) On right side, read the length in inches to remove from aft weight fitting.

NOTE

Example 1 shows a 0.44 pound repair at blade station 190 (170 inches inboard of blade tip). This repair requires 0.23 pound or 19/32-inch of weight to be removed. Example 2 shows a 0.53 pound repair at blade station 300. This repair requires 0.45 pound or 1 1/8-inch be removed from the aft weight fitting.

CHART 1
BLADE SPAN WEIGHT CORRECTION FOR FAIRING
SKIN AND CORE REPAIRS



NOTE
WEIGHT MAY BE
REMOVED FROM
EITHER TUBE OF
AFT FITTING

723

GO TO NEXT PAGE

5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

d. Find number of tracking weights to move from aft to forward weight fitting as follows:

 (1) Measure the distance in inches from the blade leading edge to the center of the repair. Record the measurement.

 (2) Using the adhesive weight recorded for repair (Task 5-68, 5-69 or 5-70), go to appropriate chart 2.

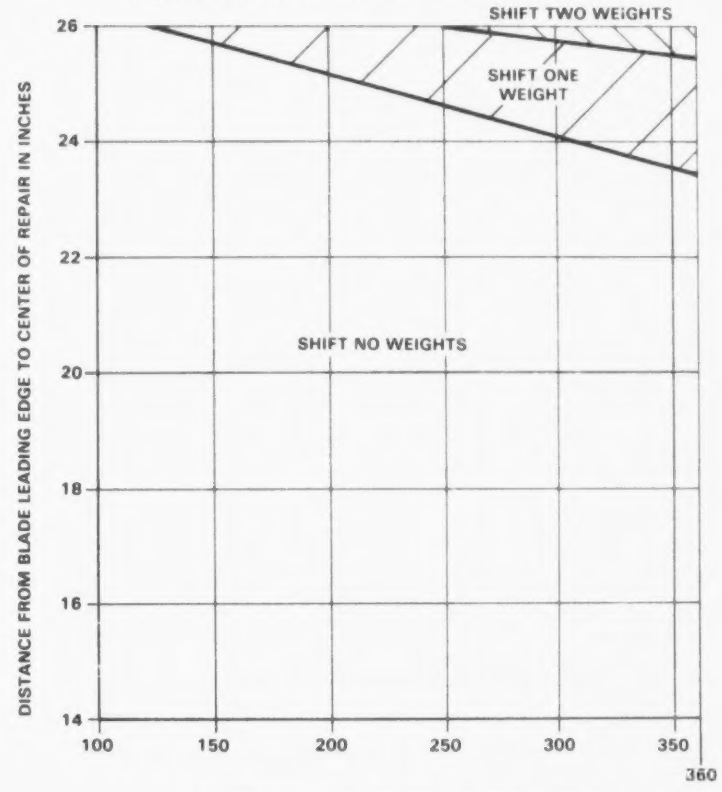
NOTE

Chart 2 consists of six graphs. Each graph covers a range of adhesive weights between 0.11 and 1.44 pounds. The weight range is shown at top of each chart.

 (3) Find blade station of repair from step b at bottom of chart. Move up to intersection of chordwise dimension from step d(1). Record number of tracking weights to be shifted.

CHART 2–GRAPH 1
REPAIRS WEIGHING 0.11 TO 0.219 POUNDS

NUMBER OF TRACKING WEIGHTS TO SHIFT
FROM AFT WEIGHT FITTING TO FORWARD WEIGHT FITTING



NOTE
WEIGHTS MAY BE REMOVED FROM EITHER TUBE OF AFT FITTING. ADD WEIGHTS EQUALLY TO BOTH TUBES OF FORWARD FITTING IF POSSIBLE.

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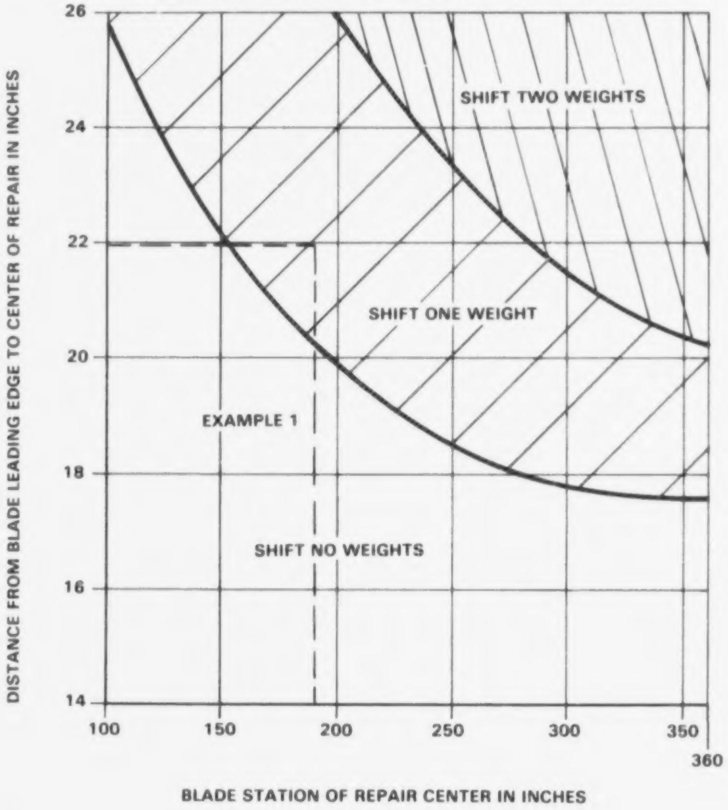
(4) Example 1 shows a repair at blade station 190, 22 inches aft of the leading edge. The adhesive weight was between 0.22 and 0.44 pounds. This repair requires shifting 1 tracking weight from aft to forward fitting.

CHART 2-GRAPH 2
REPAIRS WEIGHING 0.22 TO 0.440 POUNDS

NUMBER OF TRACKING WEIGHTS TO SHIFT
FROM AFT WEIGHT FITTING TO FORWARD WEIGHT FITTING



NOTE
WEIGHTS MAY BE REMOVED FROM EITHER TUBE OF AFT FITTING. ADD WEIGHTS EQUALLY TO BOTH TUBES OF FORWARD FITTING IF POSSIBLE.

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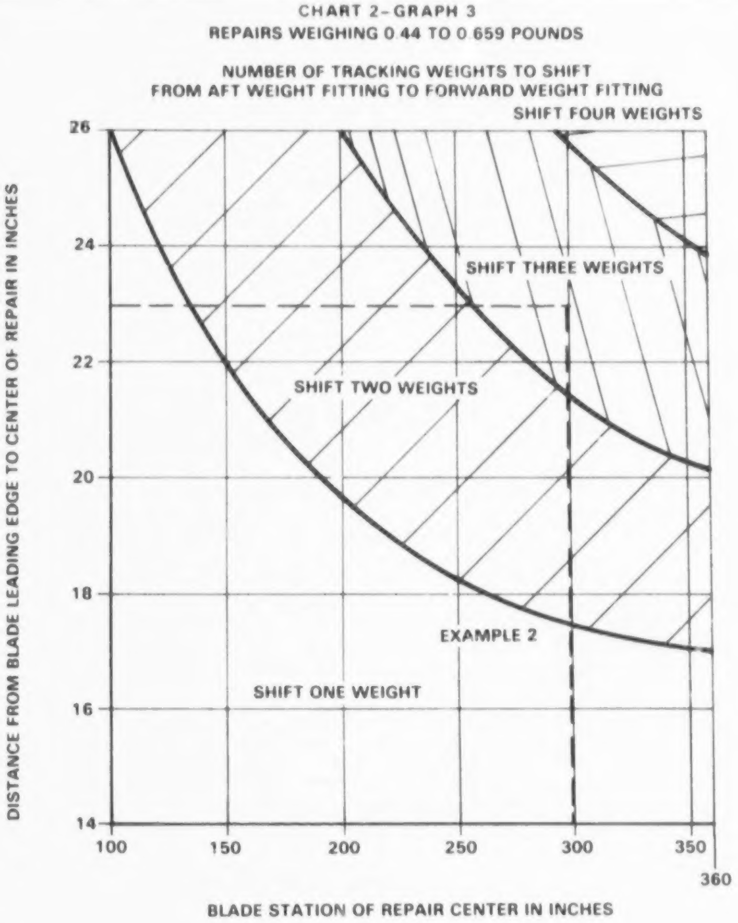
(5) Example 2 shows a repair at blade station 300, 23 inches aft of the leading edge. Adhesive weight of repair is between 0.44 and 0.659 pounds. This repair requires 3 tracking weights be shifted from aft to forward fitting.

e. Record span weight correction (step c) and tracking weight correction (step d). Go to step 6.



NOTE
WEIGHTS MAY BE REMOVED FROM EITHER TUBE OF AFT FITTING. ADD WEIGHTS EQUALLY TO BOTH TUBES OF FORWARD FITTING IF POSSIBLE.

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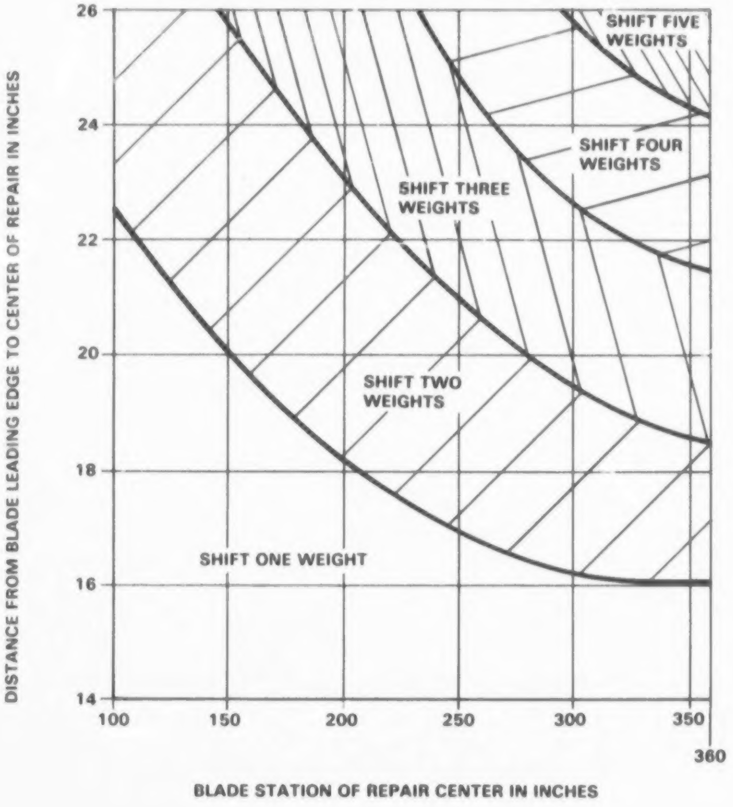
5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

CHART 2-GRAPH 4
REPAIRS WEIGHING 0.66 TO 0.88 POUNDS

NUMBER OF TRACKING WEIGHTS TO SHIFT
FROM AFT WEIGHT FITTING TO FORWARD WEIGHT FITTING



NOTE
WEIGHTS MAY BE REMOVED FROM EITHER TUBE OF AFT FITTING. ADD WEIGHTS EQUALLY TO BOTH TUBES OF FORWARD FITTING IF POSSIBLE.

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5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

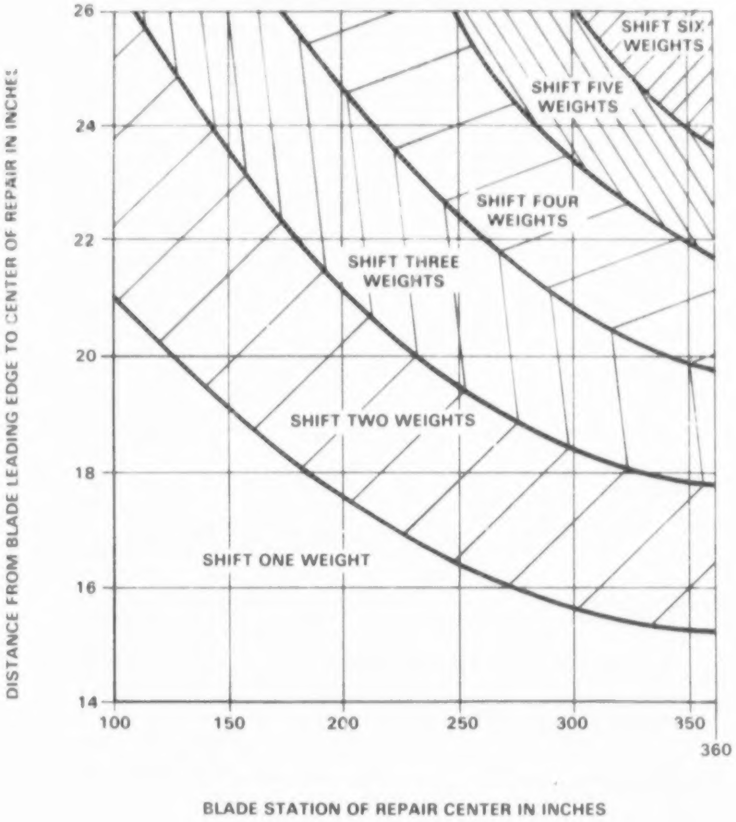

CHART 2– GRAPH 5
REPAIRS WEIGHING 0.89 TO 1.11 POUNDS

NUMBER OF TRACKING WEIGHTS TO SHIFT
FROM AFT WEIGHT FITTING TO FORWARD WEIGHT FITTING

NOTE
WEIGHTS MAY BE REMOVED FROM EITHER TUBE OF AFT FITTING. ADD WEIGHTS EQUALLY TO BOTH TUBES OF FORWARD FITTING IF POSSIBLE.

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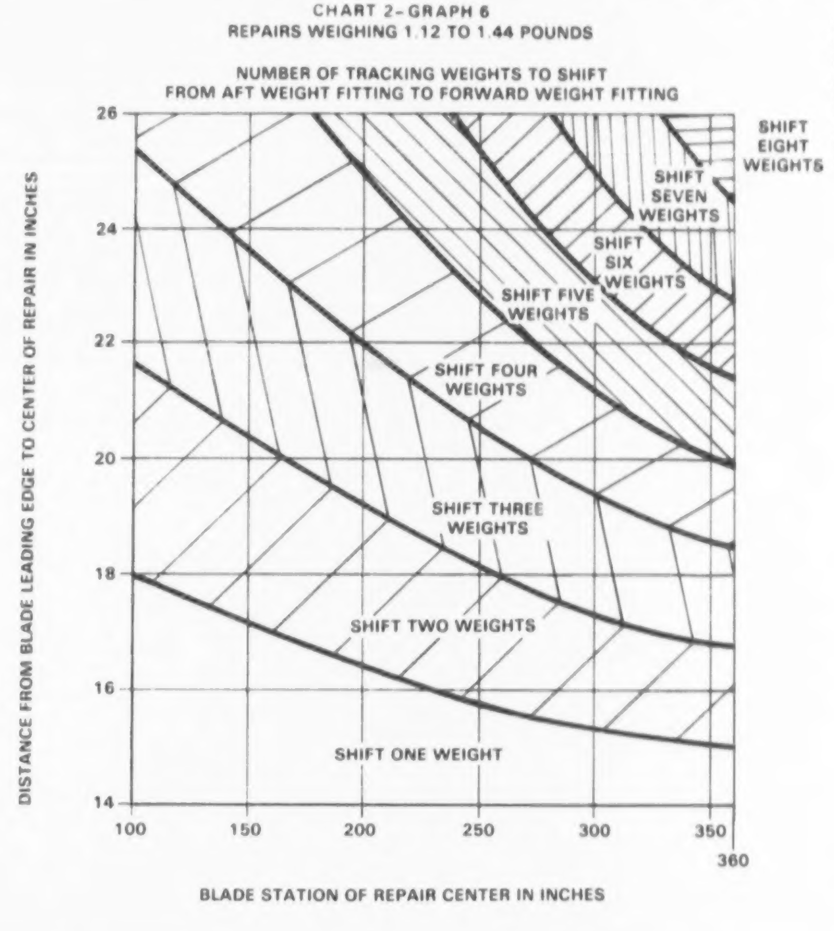
5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1



NOTE
WEIGHTS MAY BE REMOVED FROM EITHER TUBE OF AFT FITTING. ADD WEIGHTS EQUALLY TO BOTH TUBES OF FORWARD FITTING IF POSSIBLE.

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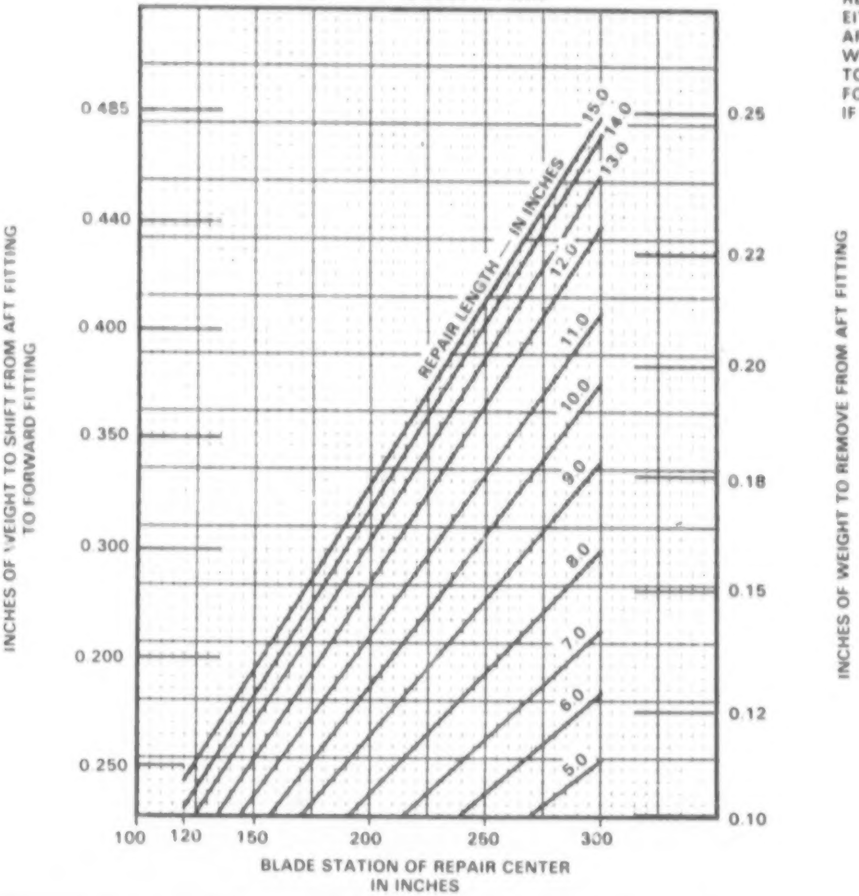
5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

3. **Find span balance weight correction for major trailing edge repair (Task 5-72) as follows:**
   a. Measure distance in inches from blade tip to center of trailing edge repair.
   b. Subtract the distance in step a from 360. The difference is the blade station. Record blade station.
   c. Measure the length of the repair in inches. Record repair length.
   d. Determine balance weight adjustment from chart 3 as follows:
      (1) At bottom of chart 3, find blade station recorded in step b.
      (2) Go up blade station line to intersection with repair length recorded in step c.

CHART 3
BLADE SPAN WEIGHT CORRECTION
FOR TRAILING EDGE REPAIRS



NOTE
WEIGHTS MAY BE REMOVED FROM EITHER TUBE OF AFT FITTING. ADD WEIGHTS EQUALLY TO BOTH TUBES OF FORWARD FITTING IF POSSIBLE

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5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

(3) From intersection of blade station and repair length lines, move across to left edge of chart. Find inches of weight to shift from aft to forward fitting. Record weight adjustment required.

(4) From intersection of blade station and repair length lines, move across to right edge of chart. Find inches of weight to remove from aft fitting. Record weight adjustment required.

NOTE

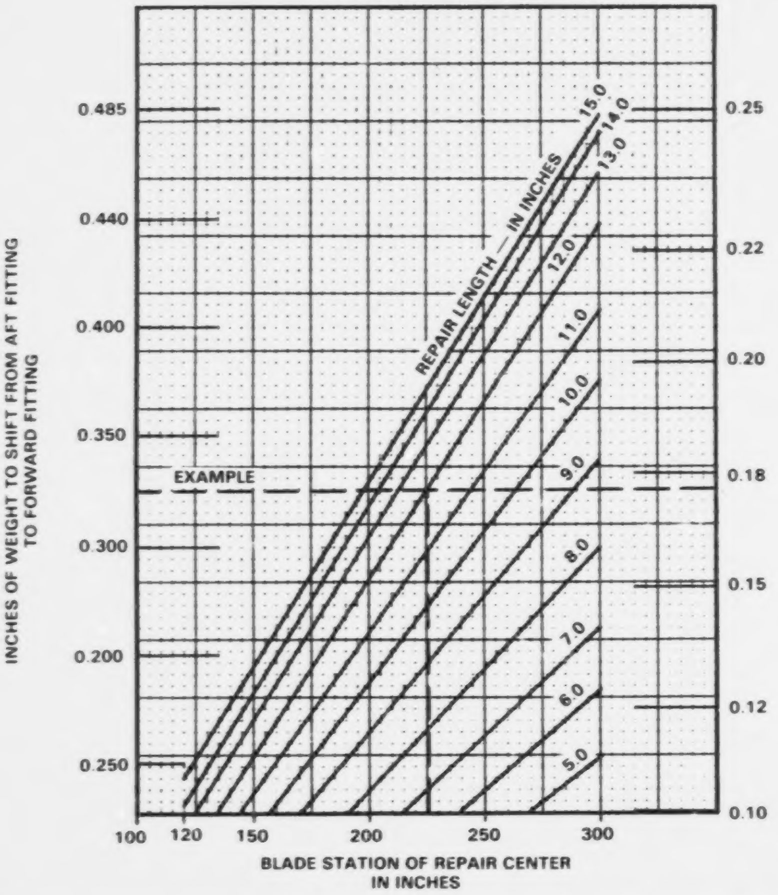
Example shows a 12-inch trailing edge repair centered at blade station 225. This repair would require weight adjustments as follows:

(a) From left edge of chart, shift 0.325-inch of weight from aft tube to forward fitting.

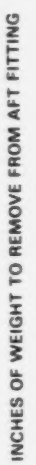
(b) From right edge of chart, remove 0.174-inch of weight from aft fitting.

e. Adjust balance weights. Go to step 7.

CHART 3
BLADE SPAN WEIGHT CORRECTION
FOR TRAILING EDGE REPAIRS



NOTE
WEIGHTS MAY BE REMOVED FROM EITHER TUBE OF AFT FITTING. ADD WEIGHTS EQUALLY TO BOTH TUBES OF FORWARD FITTING IF POSSIBLE.



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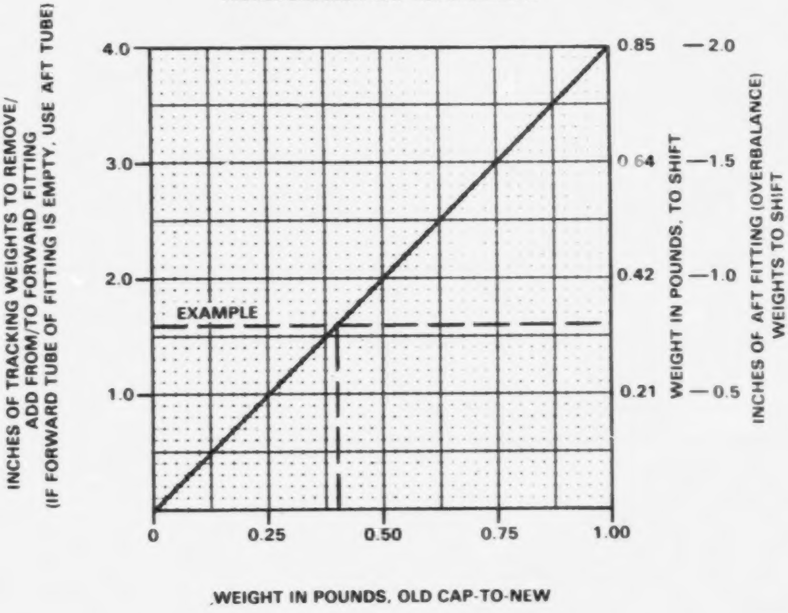
5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

4. **Find span balance weight adjustment for nickel erosion cap replacement (Task 5-66) as follows:**
   - a. Find erosion cap weight difference (Task 5-66) at bottom of chart 4.
   - b. Move up along weight difference line to intersect diagonal line on chart 4. Example shows weight difference of 0.40 pound.
   - c. Move across to left edge of chart 4 to find tracking weight adjustment. Example shows weight difference of 0.40 pound requires tracking weight adjustment of 1.6 inches. If new cap is heavier than removed cap, weight must be removed from forward fitting. If new cap is lighter than removed cap, weight must be added to forward fitting. Record tracking weight adjustment.
   - d. Move across to right edge of chart 4 to find span balance weight adjustment. Example shows weight difference of 0.40 pound requires balance weight adjustment of 0.80 inch (0.33 pound). If new cap is heavier than removed cap, weight must be shifted from forward fitting to aft fitting. If new cap is lighter, weight must be shifted from aft fitting to forward fitting. Record balance weight shift. Go to step 6.

CHART 4
BLADE SPAN WEIGHT CORRECTION
NICKEL EROSION CAP REPLACEMENT



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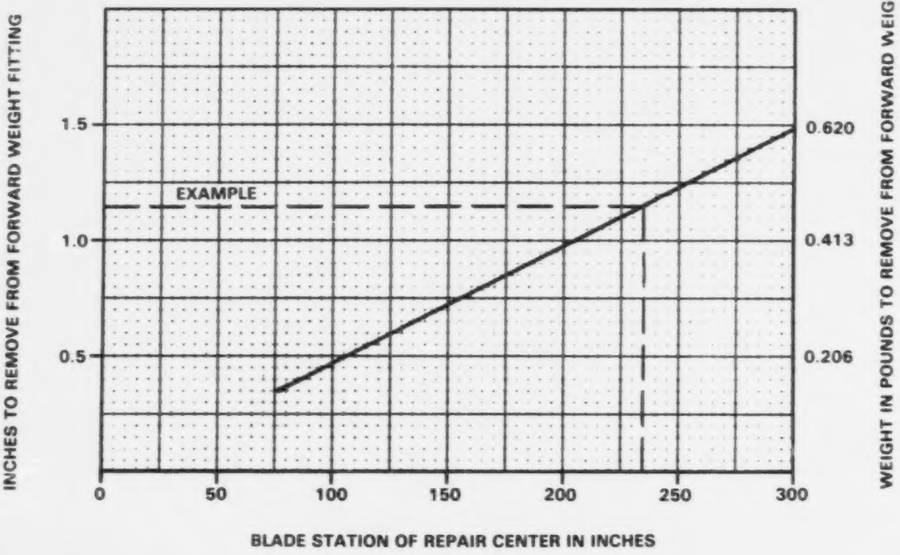
5. **Find span balance weight correction for titanium nose cap crack repair (Task 5-66.2) as follows:**
   a. Measure distance in inches from tip of blade to center of repair doubler. Record measurement.
   b. Subtract measurement obtained in step a from 360. The difference is the blade station of repair. Record blade station.
   c. At bottom of chart 5, find blade station of repair.
   d. Move up blade station line to intersect diagonal line on chart 5.
   e. Move across chart to left edge to find amount of weight to remove from forward fitting. Example shows repair centered at blade station 235. Repair requires 1.15 inches of span weight to be removed from forward fitting.
   f. Record span weight correction from chart 5. Go to step 6.

CHART 5
BLADE SPAN WEIGHT CORRECTION
TITANIUM NOSE CAP REPAIR

(NO REPAIR PERMITTED OUTBOARD OF STA 303.0)



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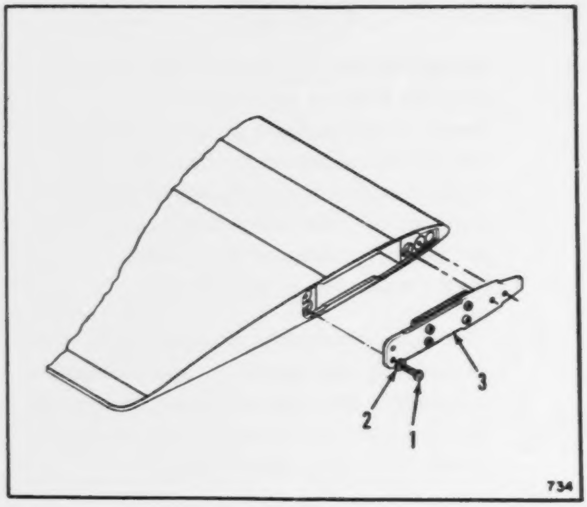
5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

6. **Remove tracking weights and span balance weights** as follows:

   a. Remove lock wire from screws (1). **Remove four screws (1)** and washers (2) from tip cover (3). **Remove tip cover.**

   b. **Review balance weight adjustment required** (steps 2 thru 5). Recheck calculations for accuracy.



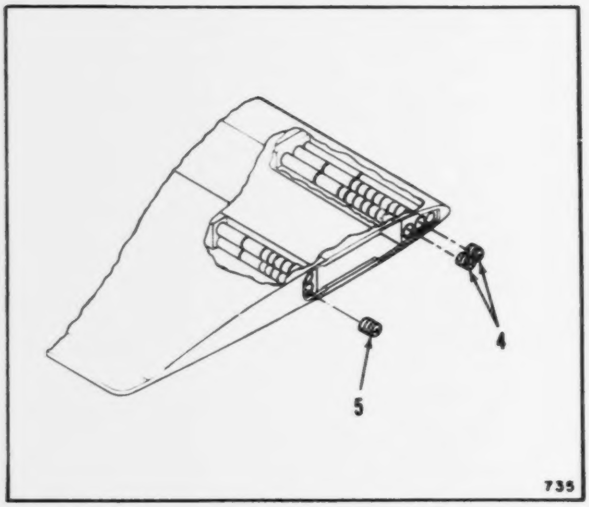
CAUTION

Make sure that blade is level or tip slightly higher than root end. If weights slide out of tubes and become mixed, weight reference will be lost.

c. **Remove forward tube end caps (4)** and **aft tube end cap (5)** as required.

NOTE

If aft tube weight adjustment is required, add or remove weight from upper tube first. If upper tube is full or empty, use lower tube.



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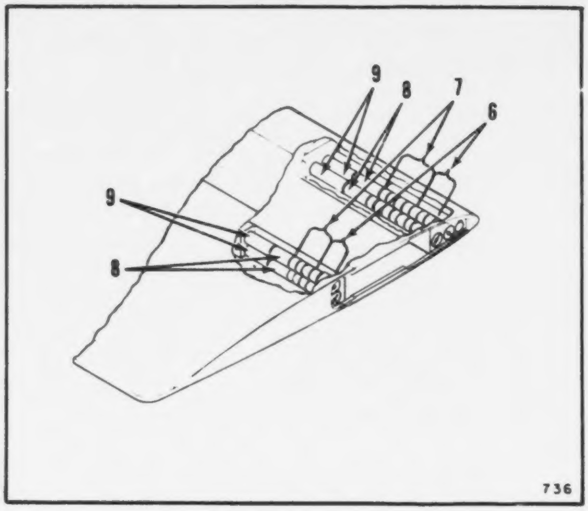
5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1



CAUTION

Weights and spacers must be removed from one tube at a time. Each weight and spacer should be marked to identify the tube it came from. Keep weights from each tube separated. Improper adjustment can make blade tracking impossible.

d. **Remove tracking spacers (6), tracking weights (7), span balance weights (8) and wooden spacer (9)** from tube. Keep weights and spacers from each tube separated.

NOTE

A stiff wire, bent 90 degrees at the end to form a hook, can be used to remove spacers and weights.

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5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

7. **Make span balance weight (8) adjustments as follows:**

NOTE

If both span balance weight and tracking weight adjustments are required, make span weight adjustment first.

a. Measure length of span balance weight (8) removed from tube. Record measurement.

b. Measure length of wooden spacer (9) removed from tube. Record measurement.

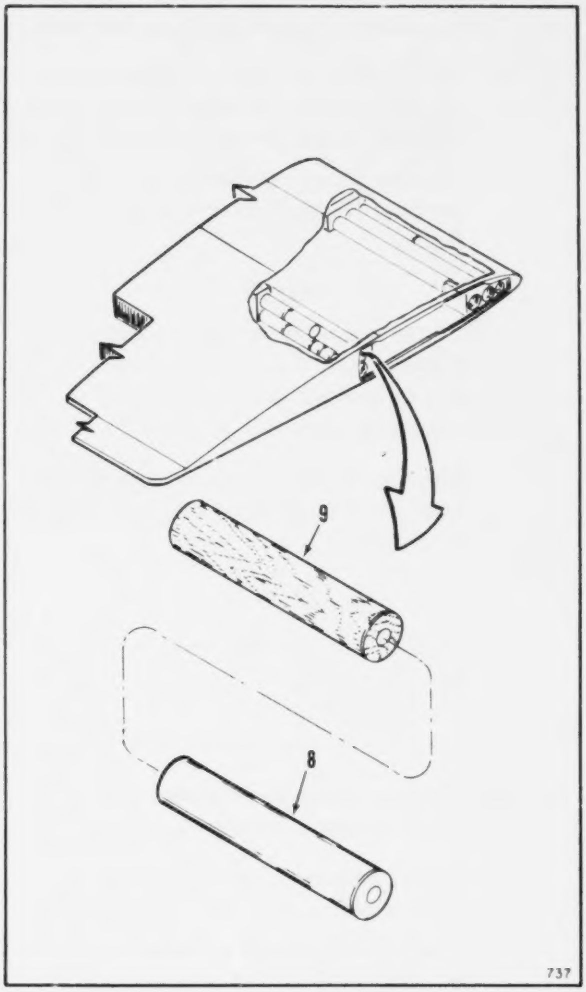
c. Add or subtract weight adjustment required (charts 1, 3, 4 and 5) to find balance weight length required.

d. To remove weight, measure and mark existing weight at length required. Measure from end of weight with threaded hole. Cut or machine to length.

e. To add weight, cut required length from new span balance weight 114R1737-1.

NOTE

The span balance weight removed may have been shortened by a previous repair. A new balance weight 114R1737-1 is 5 inches long. If required length is 5 inches or less, a new one-piece weight can be made.



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5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

8. **Shift tracking weights (7) as follows:**

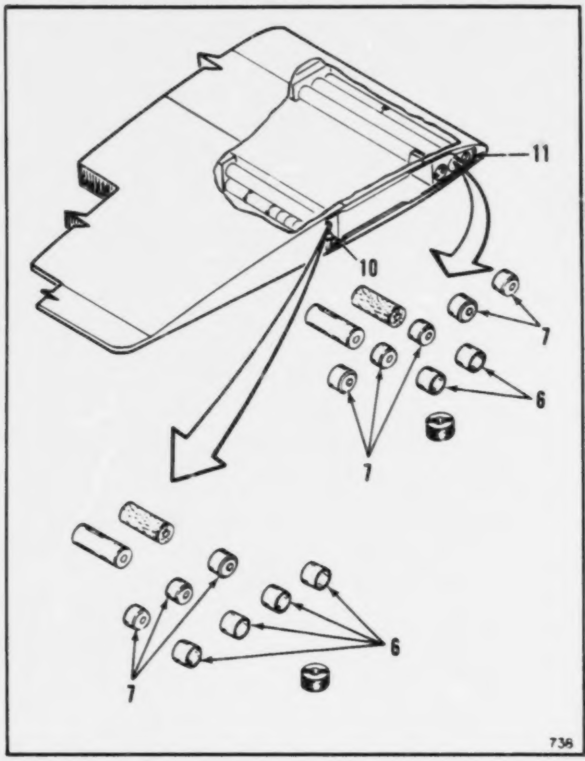
   a. Find number of tracking weights (7) to be shifted from aft weight fitting (10) to forward weight fitting (11). Use chart 2.

   b. Move required number of tracking weights (7) from aft fitting to forward fitting.

   NOTE

   Remove weight from upper tube of aft fitting first. If additional weight must be shifted, remove weights from lower tube.

   c. Move an equal number of spacers (6) from the forward tube fitting to the aft tube fitting.



9. **Install span balance weights and tracking weights** as follows:

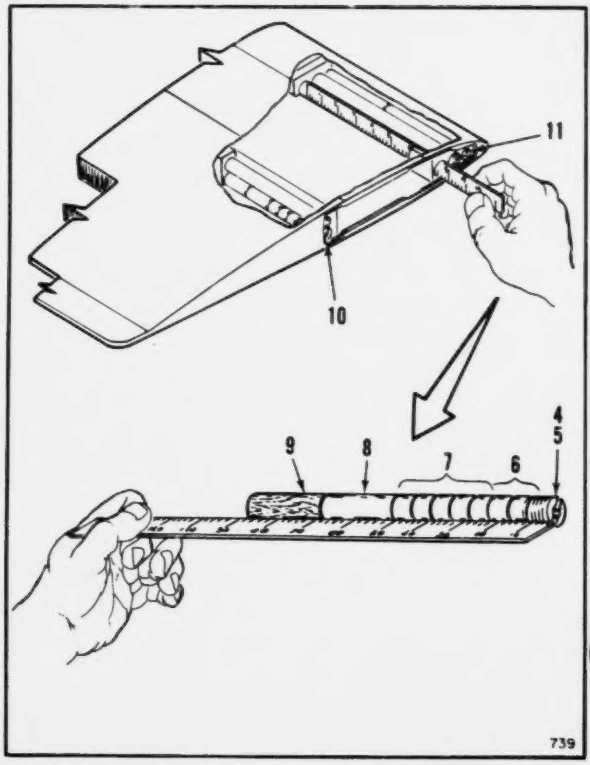
   a. Measure depth of aft tube(s) (10) and forward tubes (11). Record dimension.

   b. Measure total length of weights (7 and 8), spacers (6 and 9), and end cap (4 and 5).

   c. Compare dimensions from steps a and b. Length of assembled weights, spacers, and end cap must be same as depth of tube. If not, cut new wooden spacer (Appx E-44) (9) to required length.

   NOTE

   When weights, spacers and end caps are installed, end cap must be flush with or recessed no more than 0.06-inch from end of tube.



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5-82.1 ADJUST BLADE BALANCE WEIGHTS (Continued) 5-82.1

CAUTION

Make sure weights are installed in their proper tubes. Incorrect installation will make blade tracking impossible.

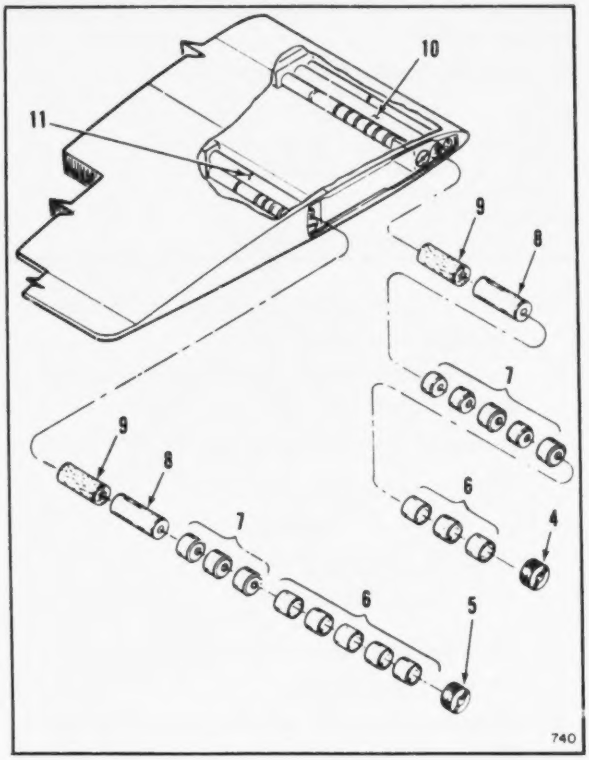
d. **Install spacers and weights** in the following order:

  (1) Wooden spacer (9).
  (2) Span balance weight (8).
  (3) Tracking weights (7).
  (4) Tracking spacer (6).
  (5) Slotted end cap (4 and 5).

  End cap must thread into tube without binding. If not, remove end cap, clean threads and reinstall.

e. **Torque end cap (4 and 5) to 100 to 150 inch-pounds.**

f. Check that end cap (4 and 5) is flush or recessed no more than 0.06-inch from end of tube (10 and 11). If not, remove end cap, weights and spacers. Make new wooden spacer (9) or shorten existing spacer (9) as required to obtain correct length. Repeat steps d and e.



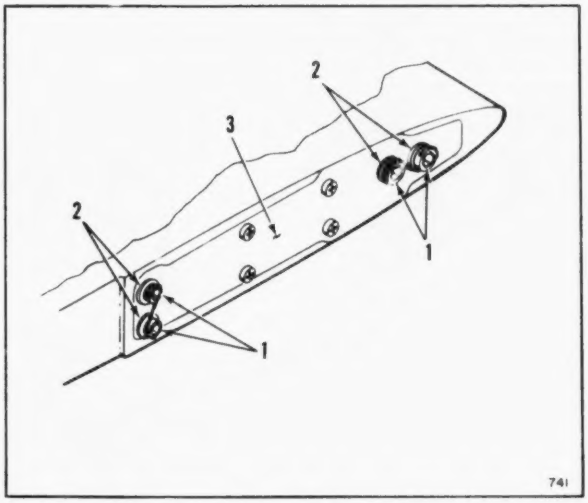
g. Position tip cover (3). Install 4 screws (1) and washers (2). **Torque screws (1) to 160 to 190 inch-pounds.**

h. Lockwire screws (1). Use lockwire (E233).

INSPECT

FOLLOW-ON MAINTENANCE:

Track and balance rotor blades (Task 5-139, 5-140, 5-141, 5-142 and 5-143).



END OF TASK

5-83 PLACE ROTARY-WING BLADE IN SERVICE 5-83

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Wood Blocks

Materials:
Dry Cleaning Solvent (E162)
Cloth (E120)
Gloves (E186)

Personnel Required:
Medium Helicopter Repairer (8)

References:
TM 55-1520-240-23P

Equipment Condition:
Off Helicopter Task

1. Remove record receptacle cap (1). **Remove records** and install cap.
2. Loosen 22 turnlocks (2). Have helpers **remove cover (3).**
3. **Remove bolt (4),** washers (5), and spacer (6).

NOTE

Forward blade is top side down in container (T86).

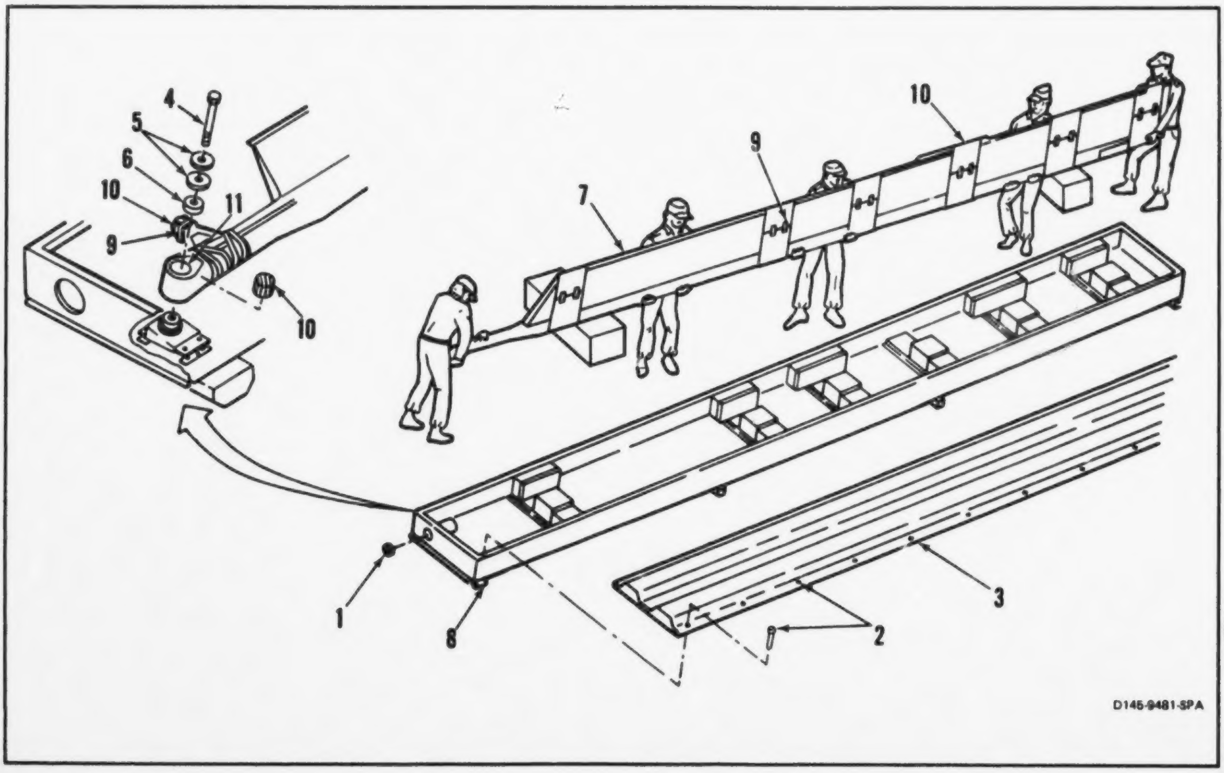
4. Have helpers **remove blade (7)** and place on wood blocks (8).
5. **Remove tape (9) and barrier material (10).**

WARNING

Dry cleaning solvent (E162) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

6. Clean socket (11). Use cloth (E120) damp with dry cleaning solvent (E162). Wear gloves (E186).
7. **Check blade (7) for damage.** There shall be no damage.

FOLLOW-ON MAINTENANCE:
Install rotary-wing blade (Task 5-84).



END OF TASK

5-84 INSTALL ROTARY-WING BLADE 5-84

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic Tool Kit, NSN 5180-00-323-4692
Rotary-Wing Blade Sling (T35)
Vertical Pin Reaction Adapter Set (T47)
Vertical Pin Protective Cap (T70)
Torque Wrench (T48)
Hoist
Rope Guideline
Torque Wrench, 5 to 50 Inch-Pounds
Torque Wrench, 0 to 600 Foot-Pounds
Rawhide Mallet

Materials:
Antiseize Compound (E76) or Grease (E190)
Dry Cleaning Solvent (E162)
Cloth (E120)
Lockwire (E231)
Gloves (E186)
Tape (E395)

Personnel Required:
Medium Helicopter Repairer (6)
Inspector

References:
TM 55-1520-240-23P
Task 5-64
Task 5-84
Task 5-37

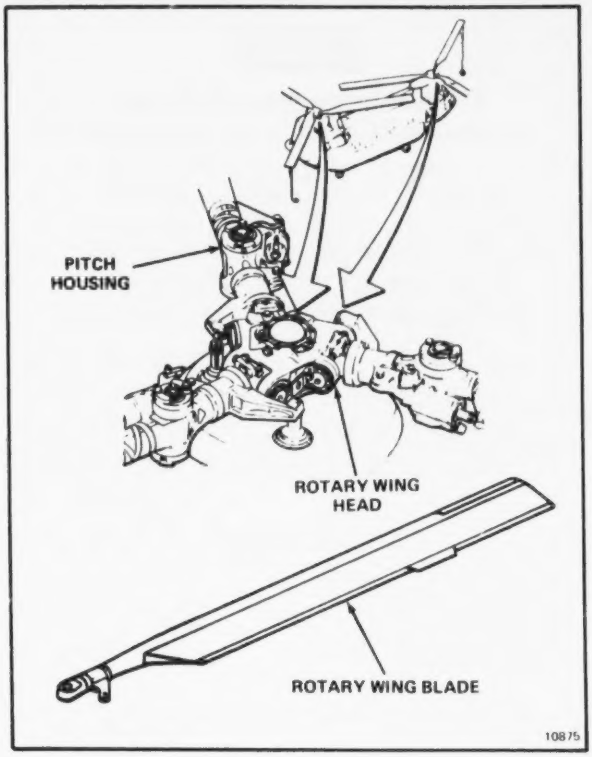
General Safety Instructions:

WARNING

Dry cleaning solvent (E162) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

- Positive retention bolts are installed in shock absorber connections. They have a pawl which prevents nut or bolt removal unless pawl is depressed.
- Procedure is similar to install any rotary-wing blade.



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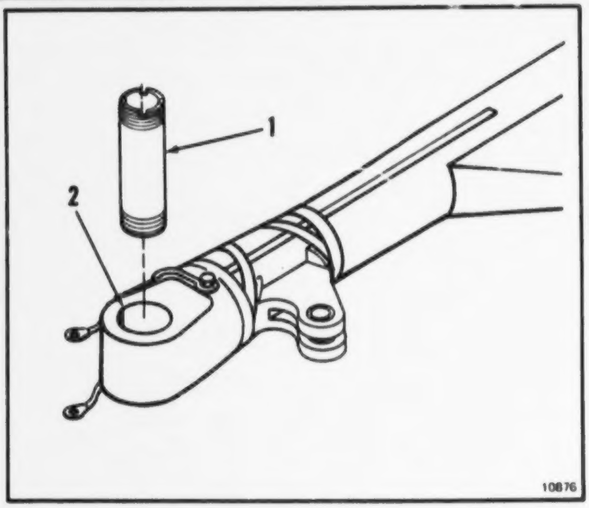
WARNING

Vertical hinge pins shall have letters EC next to serial number.

CAUTION

Do not install blade with shock absorber attached to bracket. Damage to bracket can occur.

1. Clean vertical pin (1) and blade bore (2). Use cloth (E120) damp with solvent (E162). Wipe pin and bore dry. Wear gloves (E186).
2. Check that bore (2) is undamaged.

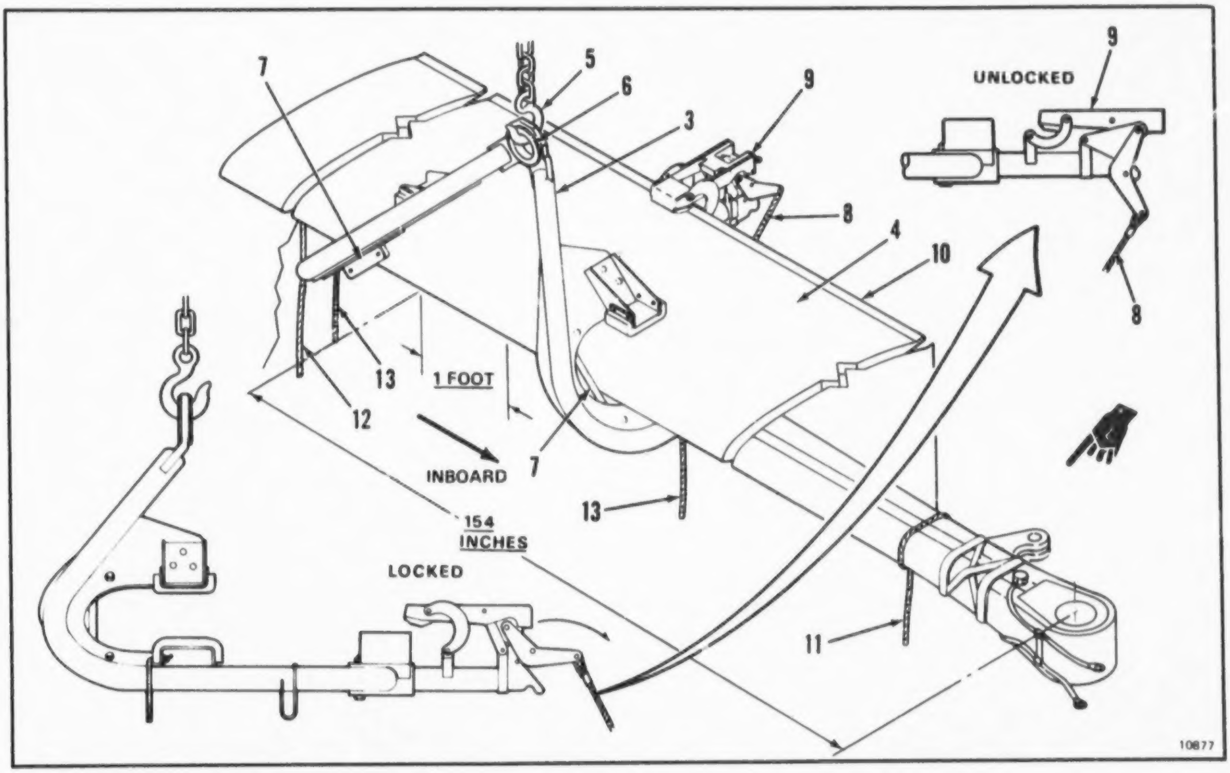


3. **Lift blade sling (T35) (3)** up to blade (4). Use hoist (5). Align eye (6) of sling with marked balance point. If shock absorber is installed, align eye (6) 1 foot inboard of balance point.
4. Have helpers **guide sling (T35) (3) until two bumpers (7) contact blade (4).** Pull release rope (8) away from blade to **lock clamp (9)** on trailing edge (10).
5. Attach rope guideline (11) to root end of blade (4).
6. Attach tiedown line (12) to blade (4).

WARNING

Blade is heavy and can injure personnel if it drops. Blade must be supported by hoist and moved carefully. Do not use release rope on sling (T35) to guide blade. Clamp can be opened to release blade which can result in injury or equipment damage.

7. **Lift blade (4).** Use tiedown line (12), guideline (11), and guide ropes (13) to align blade (4).



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5-84 INSTALL ROTARY-WING BLADE (Continued) 5-84

8. Wipe inner bearing races (14 and 15) clean. Use cloth (E120). Check that races are into lugs (16) as far as possible.

CAUTION

Do not bump blade into housing or races. Equipment can be damaged.

9. Guide blade (4) carefully into lugs (16). Align blade bore (2) with inner races (14 and 15). Use guide rope (11) at root of blade (4).

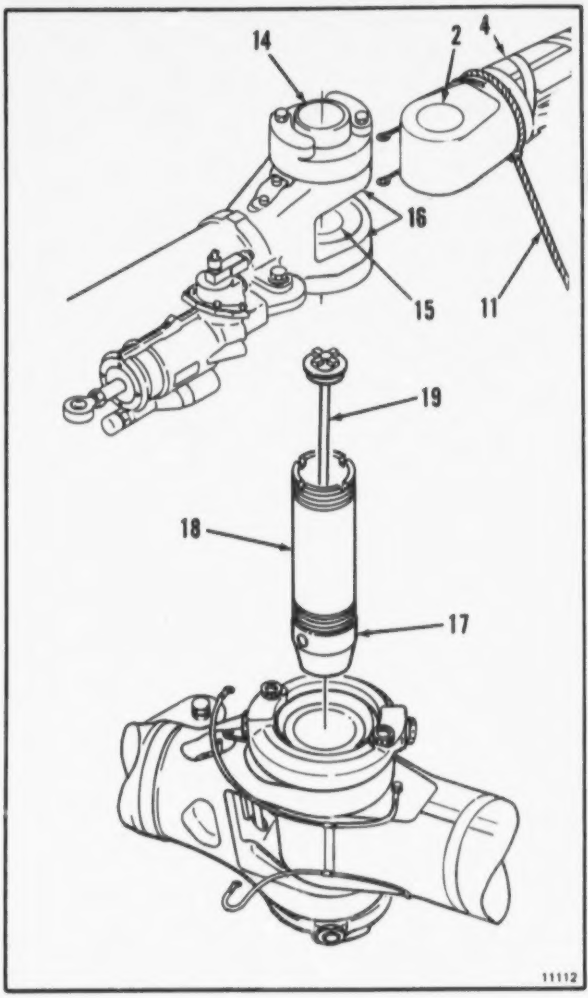
9.1. Apply antiseize compound (E76) or grease (E190) to thread of pin (18).

CAUTION

Use extreme care during pin installation. Vertical pin thread, inner bearing races, and blade pin bore lines are easily damaged.

10. Install protective cap (T70) (17) on end of pin (18) that does not have identification. Install shaft (19) in cap (T70). Install pin through upper bearing race (14). Push pin in until pin has started into lower race (15).

11. **Seat pin (18)** by tapping. Use rawhide mallet. Remove cap (T-70) (17).



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CAUTION

Lower vertical pin nut must be installed and torqued before upper nut is installed. Installing upper nut first can cause damage to pin.

12. **Install lower vertical pin nut (20)** as follows:

    a. Position pilot socket (21) on drive bar (22). Position drive bar through vertical pin (18). Have helper support drive bar (22).

    b. Install torque wrench (T48) (23) on drive bar (22). Turn handle (24) in either direction until wrench is seated on pilot socket (21).

    c. Install washer (25) and nut (26) on drive bar (22). Have helper release bar.

    d. Install lower nut (20) on pin (18) and hand tighten.

    e. Install spanner socket (27), on drive bar (22), and engage with lower pin nut (20). Install washer (25) and nut (26).

    f. Adjust upper and lower nuts (26) until drive bar (22) is seated in spanner socket (27).

CAUTION

Torque wrench (T48) must not turn during installation of lower nut. Equipment can be damaged.

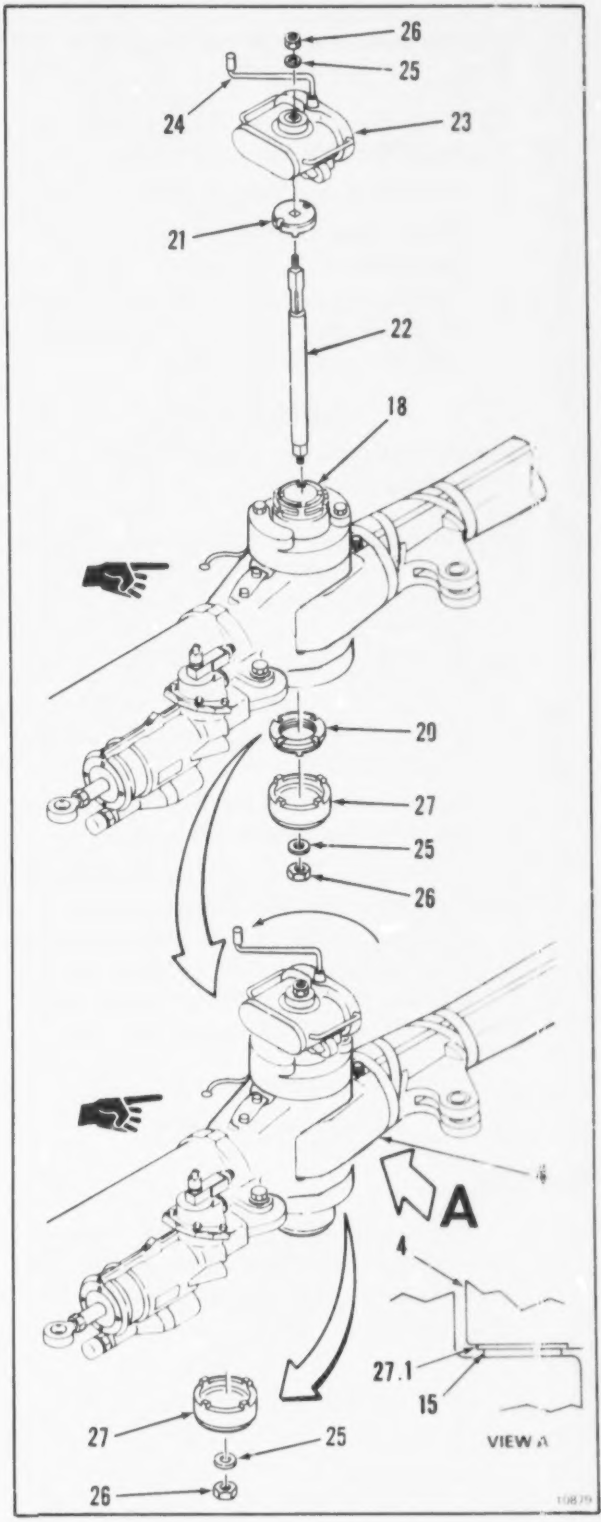
    g. Turn handle (24) counterclockwise. **Torque** lower **nut (20) to 275 foot-pounds.** Check gap between inner bearing race (15) and liner (27.1) of blade (4). Gap shall not extend more than 50 percent of contact surface.

NOTE

No limit on gap depth.

INSPECT

    h. Remove nut (26), washer (25), and spanner socket (27).



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13 **Install upper vertical pin nut (28)** as follows:

a. Have helper support drive bar (22). Remove nut (26) and washer (25).

b. Remove torque wrench (T48) (23).

c. Install upper nut (28) on pin (18) and hand-tighten.

d. Install spanner socket (27) on drive bar (22) over pilot socket (21). Seat spanner socket on upper nut (28).

NOTE

Pilot socket can be pushed out of vertical pin notches.

e. Have helper raise drive bar (22) slightly. Have him rotate bar until flats on bar seat in pilot socket (21). Continue to support bar.

f. Install torque wrench (T48) (23) on drive bar (22). Turn handle (24), in either direction, until wrench is seated on spanner socket (27).

g. Install washer (25) and nut (26) on drive bar (22). Have helper release bar.

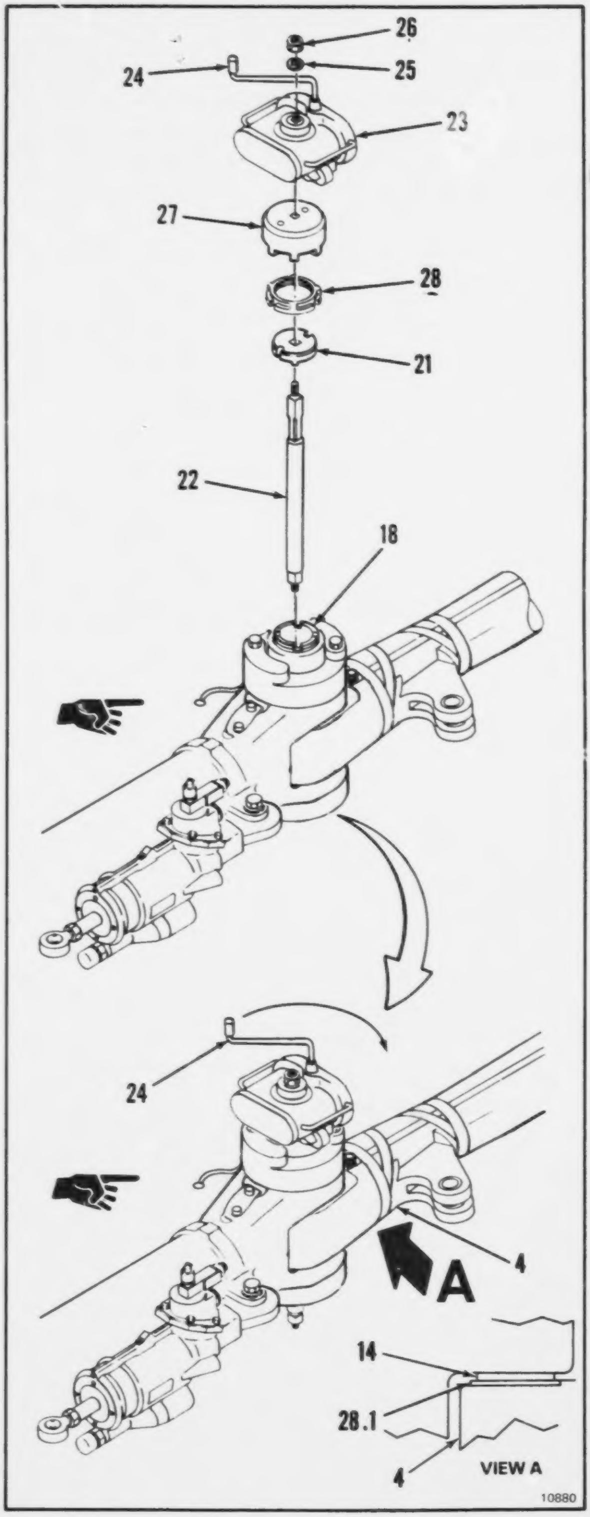
h. Turn handle (24) counterclockwise to install upper nut (28). **Torque nut to 145 foot-pounds.** Check gap between inner bearing race (14) and liner (28.1) of blade (4). Gap shall not extend more than 50 percent of contact surfaces.

NOTE

No limit on gap depth.

INSPECT

i. Remove nut (26), washer (25), torque wrench (T48) (23), spanner socket (27), pilot socket (21), and drive bar (22).



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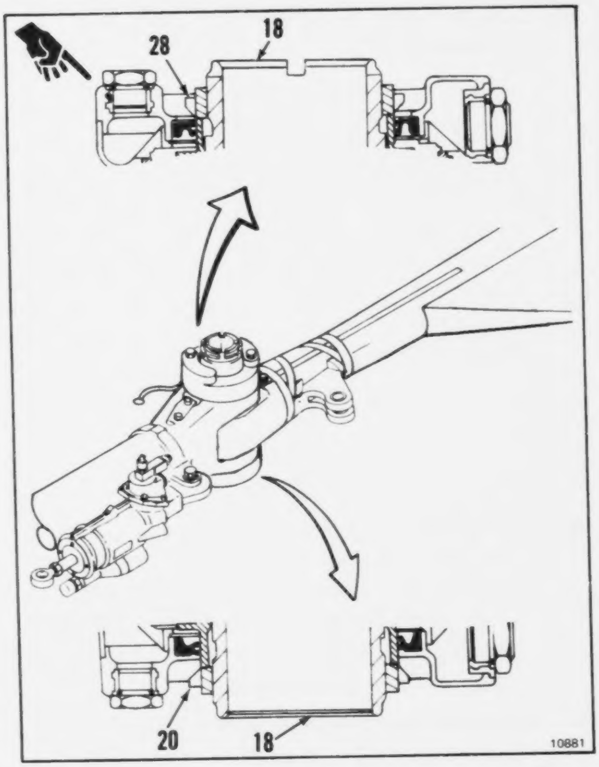
5-84 INSTALL ROTARY-WING BLADE (Continued) 5-84

14. Check nuts (20 and 28) for correct engagement with pin (18) as follows:
    a. Measure the protrusion of the top of the pin (18) above the top of the nut (28). This allows the upper threads of the pin to be recessed into the nut a maximum of two threads.
    b. Check thread engagement of pin (18) with lower nut (20). The bottom edge of the lowest thread of pin (18) must be flush with or protrude below the bottom of nut (20).
    c. If nut engagement in steps a. and b. is not within limits, replace pins or blades as required.
15. (Text Deleted)



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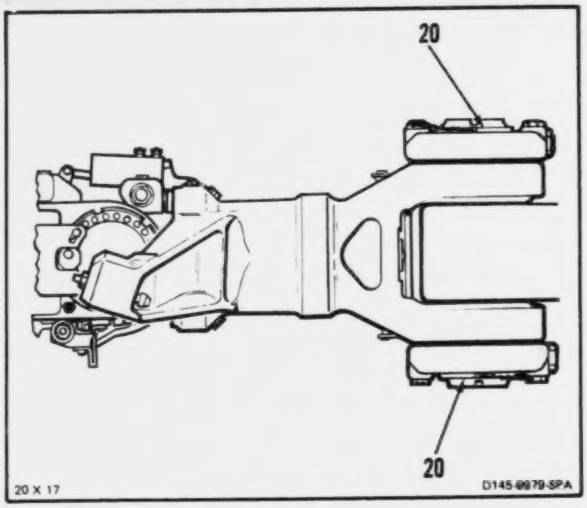
16. Lockwire two vertical pin nuts (20). Use lockwire (E231).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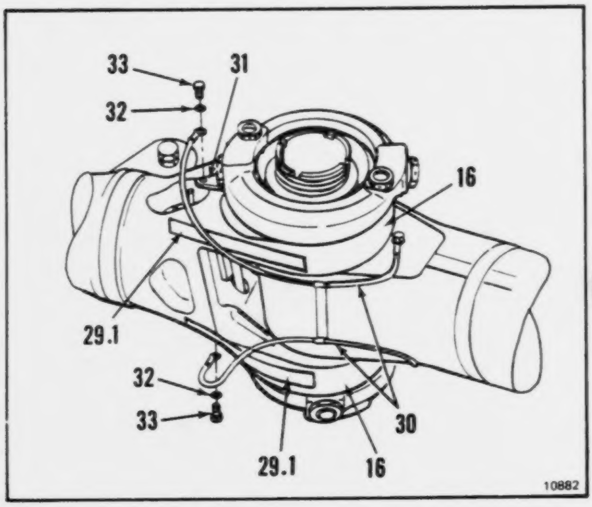
20 X 17
D145-0979-SPA

16.1. Check that there is a strip of tape (29.1) on each pitch housing lug (16) under jumper wire (30). If not, apply a 5-inch strip of tape (E395) on upper and lower lugs (16). Apply tape so that it will protect lugs from jumper wires when installed.

17. **Position two jumper wires (30)** on oil manifold tube (31). **Install** washers (32), and **bolts (33). Torque bolts to 35 inch-pounds.**


33
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32
16
29.1
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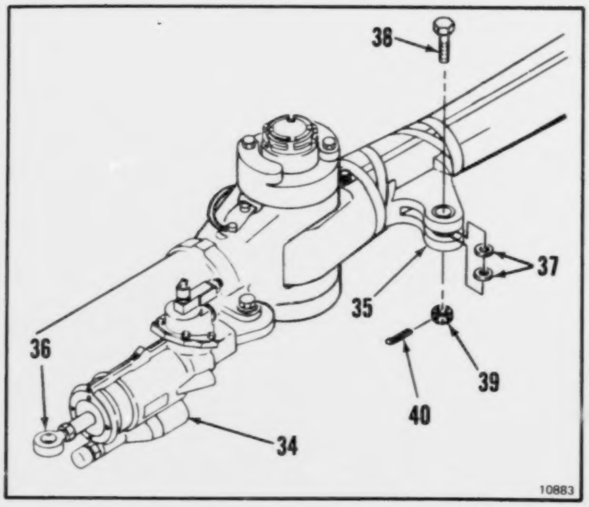
33
30
29.1
16
10882

18. **Connect shock absorber** (34) as follows:
    a. Position rod-end bearing (36) in blade lugs (35).
    b. Install two washers (37) between lugs (35) and bearing (36).
    c. Install bolt (38).
    d. Install nut (39). **Torque nut to 60 to 100 foot-pounds.** Install cotter pin (40).


38
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10883

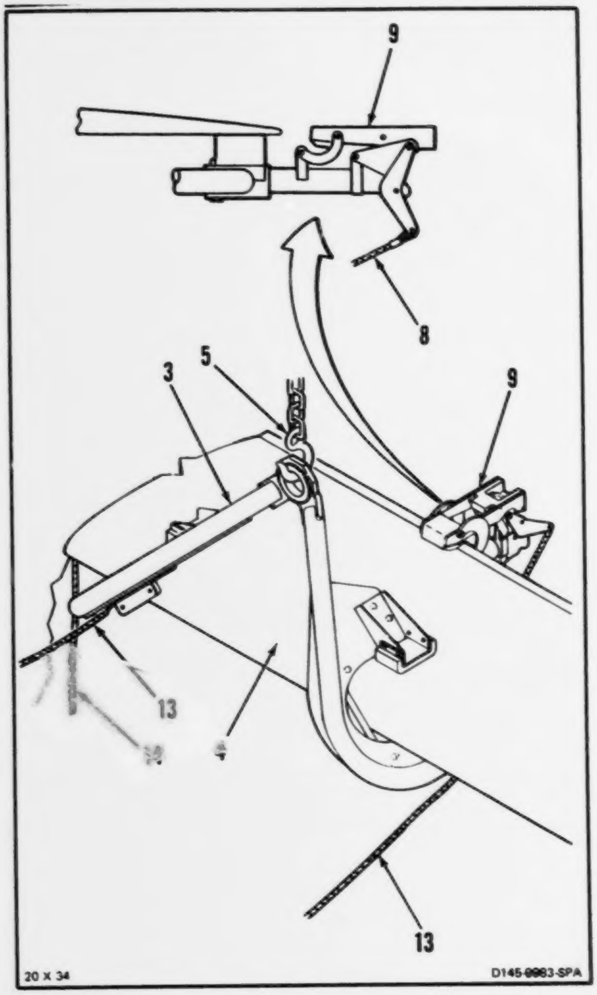
GO TO NEXT PAGE

5-84 INSTALL ROTARY-WING BLADE (Continued) 5-84

19. Pull release rope (8) under blade (4) to open clamp (9).
20. Pull two guide ropes (13) on sling (T35) (3) away from blade (4).
21. **Remove sling (T35) (3).** Remove hoist (5).

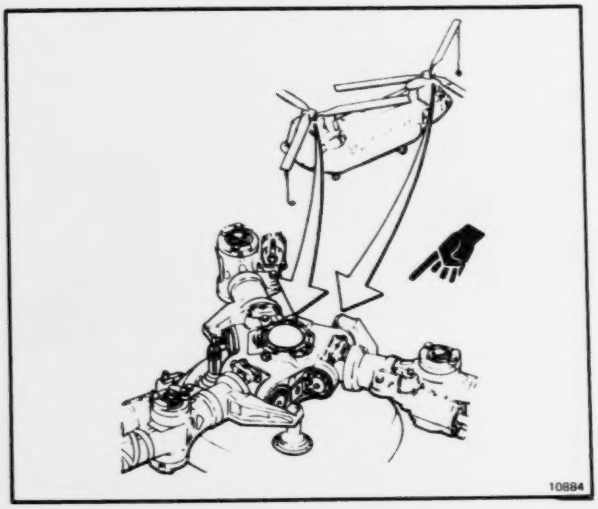
INSPECT

22. **Remove tiedown line (14)** from blade (4).



FOLLOW-ON MAINTENANCE:

Close work platforms (Task 2-2).
Track rotor system (Task 5-140).
Balance rotor system (Task 5-142).



END OF TASK

5-85 CLEAN SHOCK ABSORBER PISTON 5-85

INITIAL SETUP

Applicable Configurations:
All

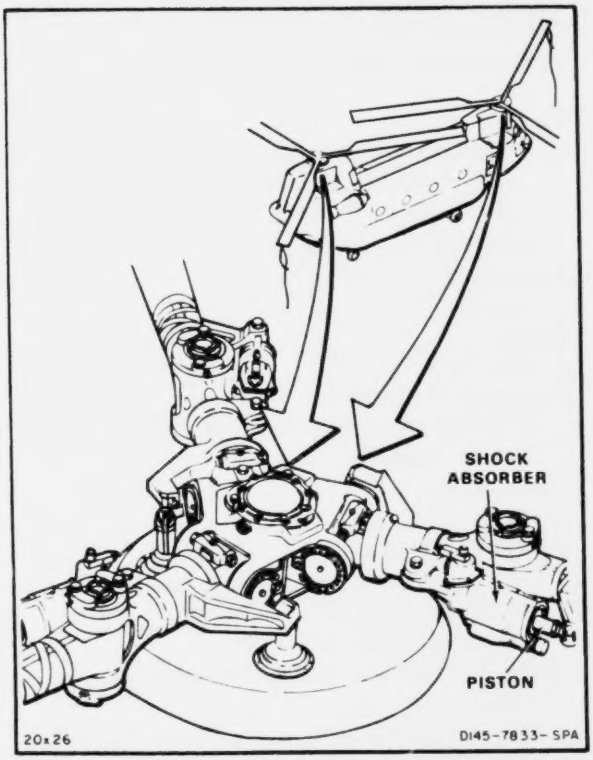
Tools:
None

Materials:
Hydraulic Fluid (E197)
Cloth (E120)

Personnel Required:
67U10 Medium Helicopter Repairer

References:
TM 55-1520-240-23P

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Blade Tied Down (Task 1-26)
Pylon and Forward Work Platforms Open (Task 2-2)



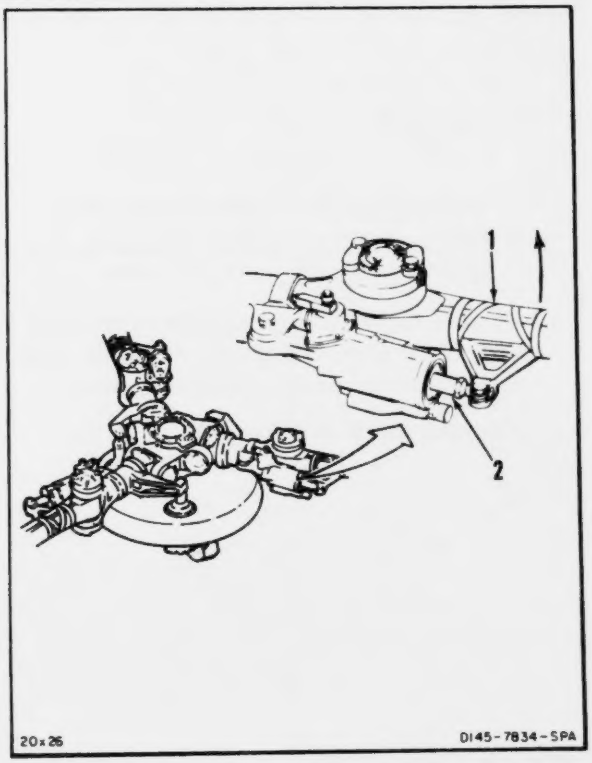
CAUTION

Do not spill hydraulic fluid (E197) on paint or rubber parts. Paint or parts can be damaged.

NOTE

Procedure is same to clean any shock absorber piston. There are six shock absorber pistons.

1. Hold blade (1) in full lead position to extend shock absorber piston (2).
2. **Wipe shock absorber piston (2) clean.** Use cloth (E120) damp with hydraulic fluid (E197).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-86 CLEAN SHOCK ABSORBER VENT VALVE FILTER 5-86

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Torque Wrench, 5 to 50 Inch-Pounds
Retaining Ring Pliers

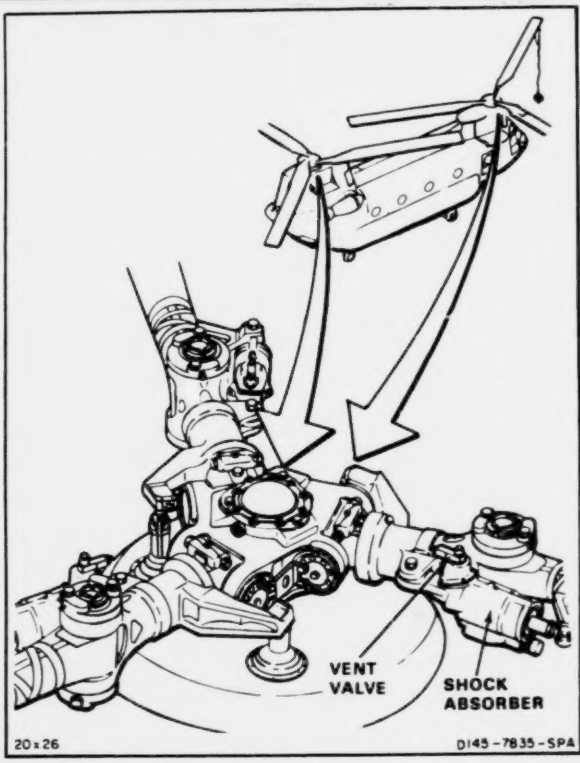
Materials:
Lockwire (E231)

Parts:
Filter Disk

Personnel Required:
67U10 Medium Helicopter Repairer
67U30 Inspector

References:
TM 55-1520-240-23P

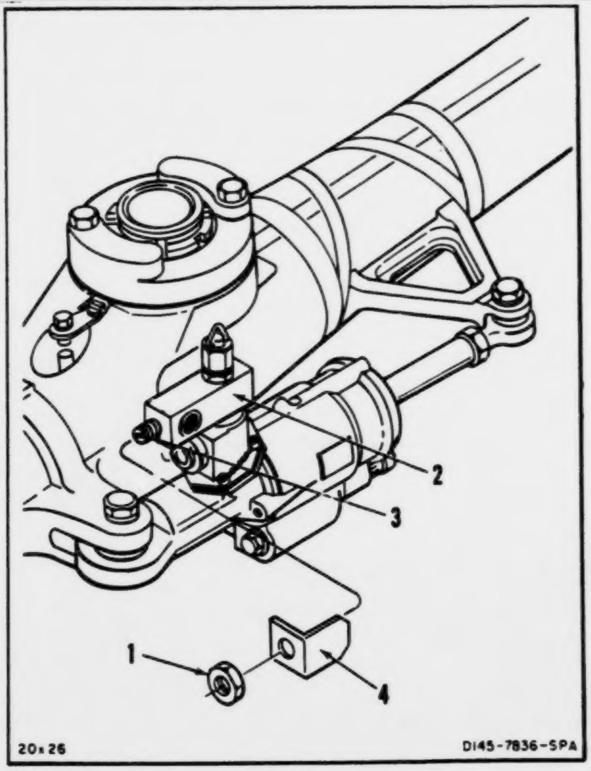
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Blade Tied Down (Task 1-26)
Pylon and Forward Work Platforms Open (Task 2-2)



NOTE

Procedure is same to check any shock absorber vent valve filter. There are six shock absorber vent valve filters.

1. Remove lockwire from nut (1) on vent valve body (2). Prevent adjustment screw (3) from turning. Use screwdriver. **Remove nut.**
2. **Remove cover bracket (4).**



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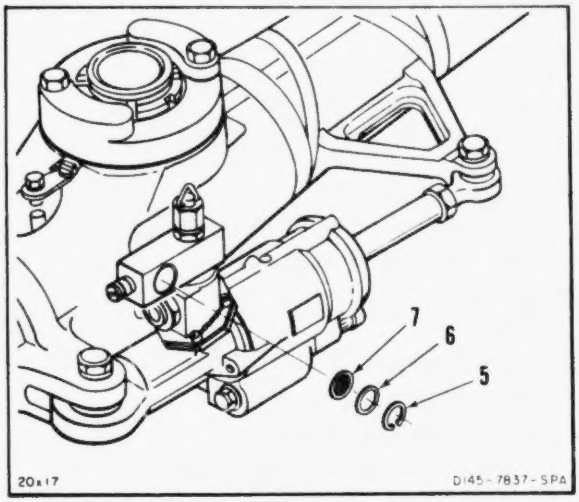
5-86 CLEAN SHOCK ABSORBER VENT VALVE FILTER (Continued) 5-86

3. Remove retaining ring (5). Use retaining ring pliers. **Remove** spacer (6) and **filter element (7).**
4. **Have filter element (7) cleaned ultrasonically.**

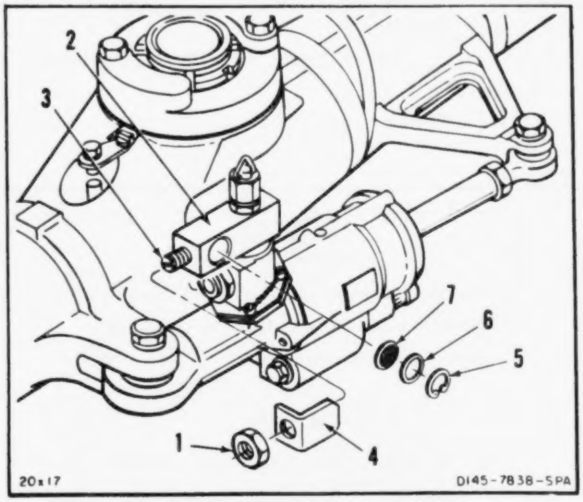
NOTE

If ultrasonic equipment is not available, filter element must be replaced.

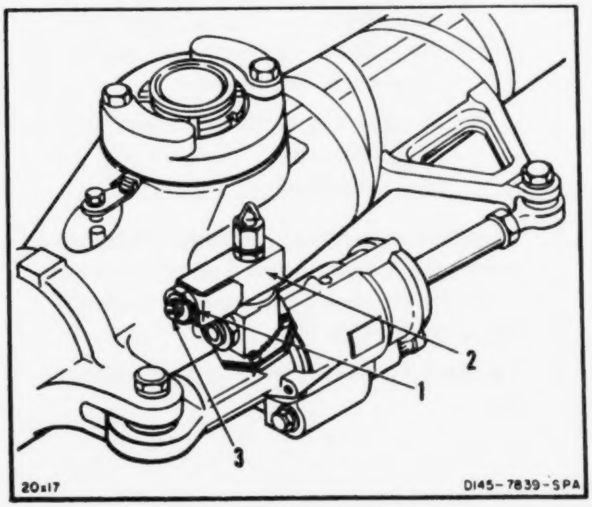
5. **Check element (7) for damage.** There shall be no damage.



6. **Install element (7)** and washer (6). Install retaining ring (5). Use retaining ring pliers.
7. **Install cover bracket (4).** Start nut (1) on adjustment screw (3) by hand. Prevent adjustment screw from turning. Use screwdriver. **Torque nut to 25 inch-pounds.**



8. Install lockwire (E231) from screw (3) to nut (1) and body (2).



INSPECT

FOLLOW-ON MAINTENANCE:

Close work platforms (Task 2-2).

END OF TASK

5-87 REMOVE SHOCK ABSORBER 5-87

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic Tool Kit,
NSN 5180-00-323-4692
Hoist
Rope Guidelines
Torque Wrench, 5 to 50 Inch-Pounds
Rotary-Wing Blade Sling (T35)

Materials:

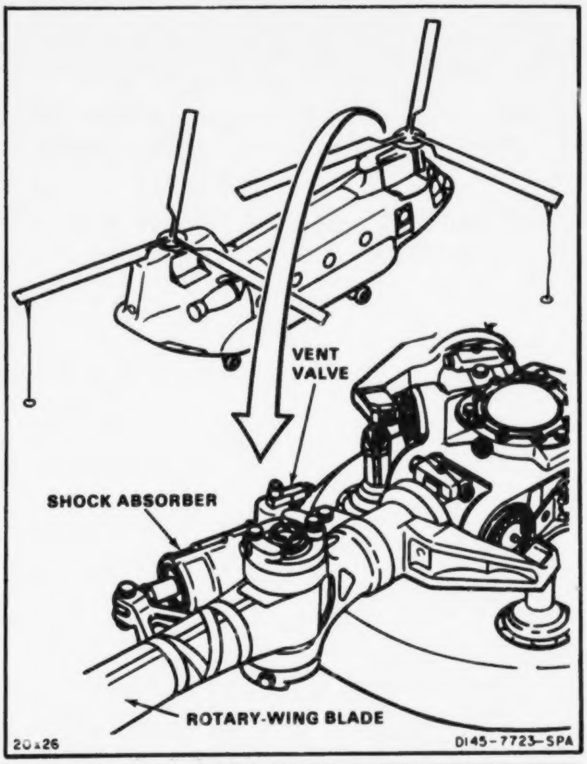
None

Personnel Required:

Medium Helicopter Repairer (2)

Equipment Condition:

Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Lines Attached to Three Rotary-Wing Blades (Task 1-26)
Work Platforms Open (Task 2-2)



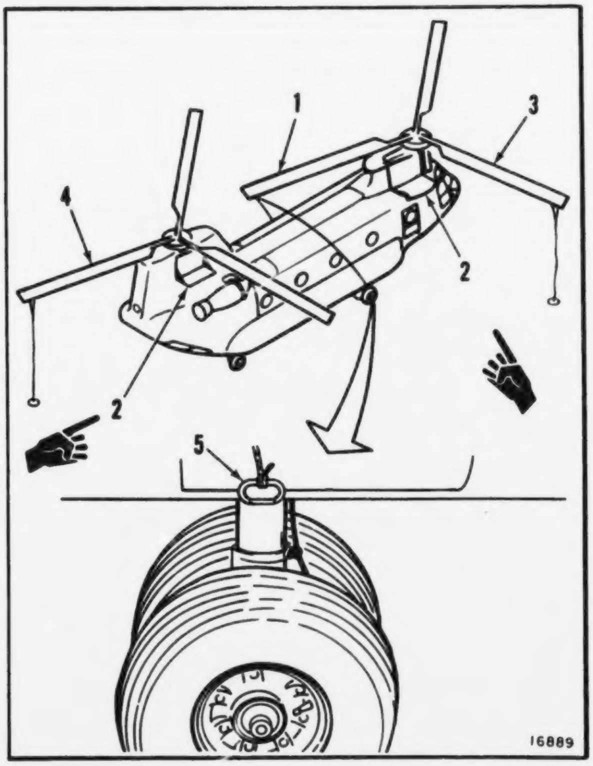
WARNING

Do not allow blade to swing. Blade can cause injury or damage to components.

NOTE

- Positive retention bolts are installed in shock absorber bearings. They have a pawl which prevents nut or bolt removal unless the pawl is depressed.
- Procedure is same to remove any shock absorber. There are six shock absorbers.

1. **Position rotary-wing blade (1)** to allow easy access from forward or aft work platform (2). Tie down one forward blade (3) and one aft blade (4).
2. Tie blade (1) to two landing gear shackles (5).



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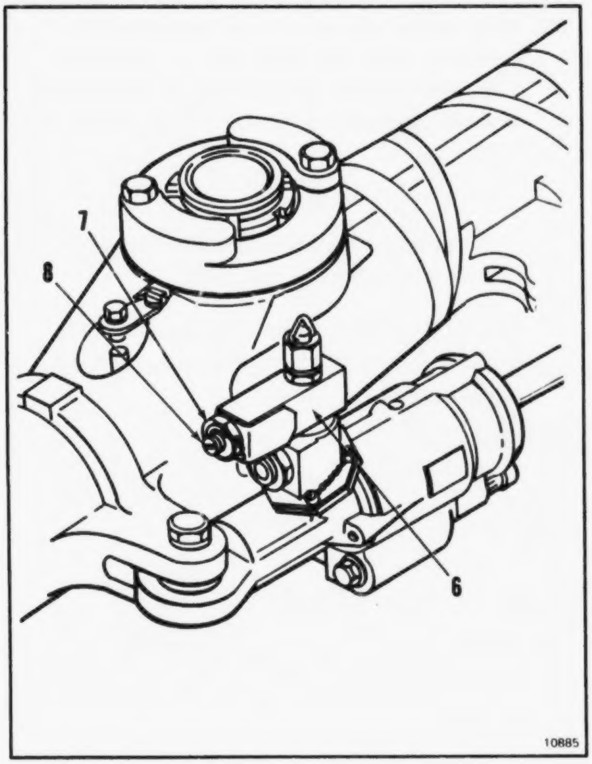
NOTE

Vent valve is opened for operation at temperatures of 0°F (−18°C) or lower.

3. **Check vent valve (6) is closed** as follows:
   a. Remove lockwire. Loosen nut (7) on adjustment screw (8).
   b. Tighten screw (8) clockwise. **Torque screw to 30 inch-pounds.**
   c. **Torque nut (7) to 25 inch-pounds.** Lockwire nut to screw (8). Use lockwire (E231).



DISCONNECT SHOCK ABSORBER FROM BLADE

4. Remove cotter pin (9) and nut (10) from self-retaining bolt (11) at outboard lugs (12).

CAUTION

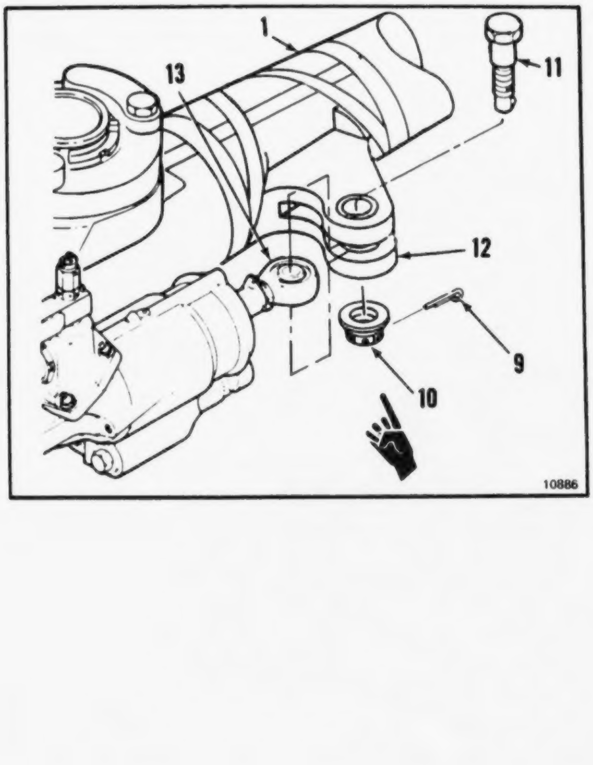
Do not remove bolt without supporting blade. Damage to blade can occur.

CAUTION

Do not use excessive force on bolt that is binding. Damage to bolt, lugs, or rod-end bearing can occur.

4.1. **Support blade (1).** Use sling (T35).

5. Have helper hold blade (1). **Remove bolt (11)** from lugs (12). If bolt binds, have helper move blade slightly in lead or lag direction.
6. **Remove rod-end bearing (13) from lugs (12).**
7. Install bolt (11) and nut (10) in lugs (12). Do not torque at this time.



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5-87 REMOVE SHOCK ABSORBER (Continued) 5-87

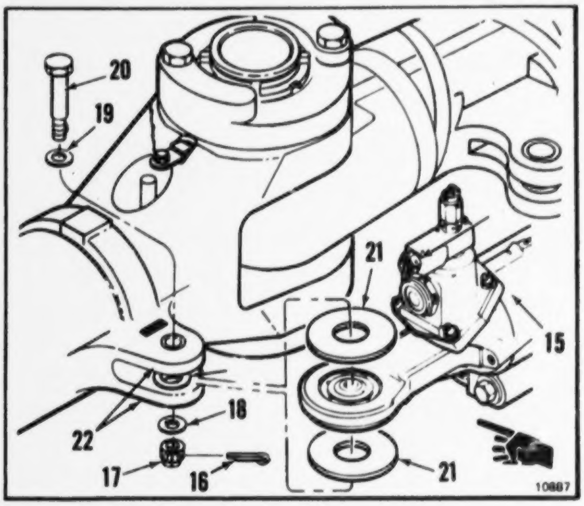
8. Have helper support shock absorber (15). Remove cotter pin (16), nut (17), washer (18), washer (19), and bolt (20). **Remove shock absorber** and two Teflon washers (21).

NOTE

Keep blade supported in sling while shock absorber is removed.

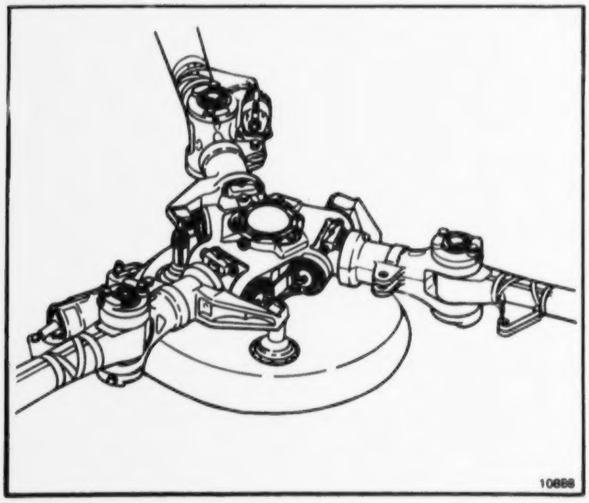
9. Install bolt (20), washer (19), washer (18), and nut (17) in pitch housing lugs (22). Do not torque at this time.

INSPECT



FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-87.1 INSPECT SHOCK ABSORBER 5-87.1

INITIAL SETUP

Applicable Configurations:
All

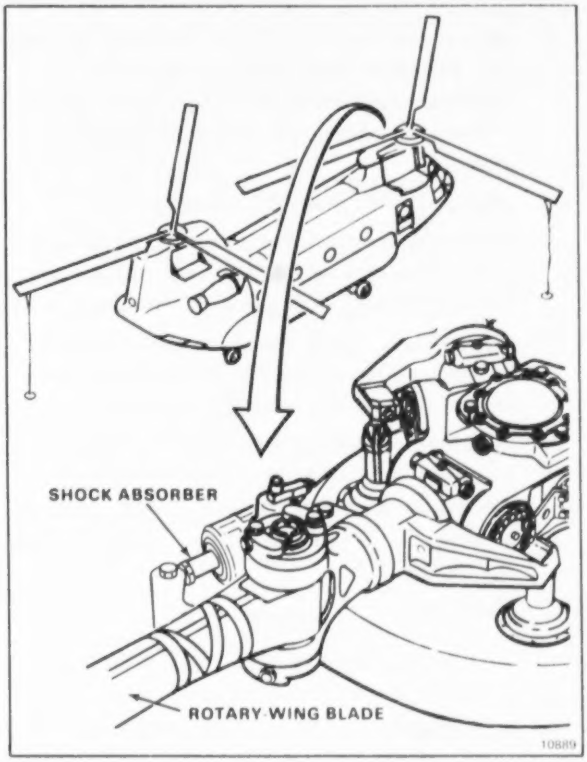
Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Rope Guidelines
Dial Indicator, 0 to 0.030 Inch, NSN 5210-00-277-8840
C-Clamp
Micrometer

Materials:
None

Personnel Required:
Medium Helicopter Repairer
Inspector

References:
Task 5-87
Task 5-93
Task 1-58

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Lines Attached to Three Rotary-Wing Blades (Task 1-26)
Work Platforms Open (Task 2-2)



WARNING

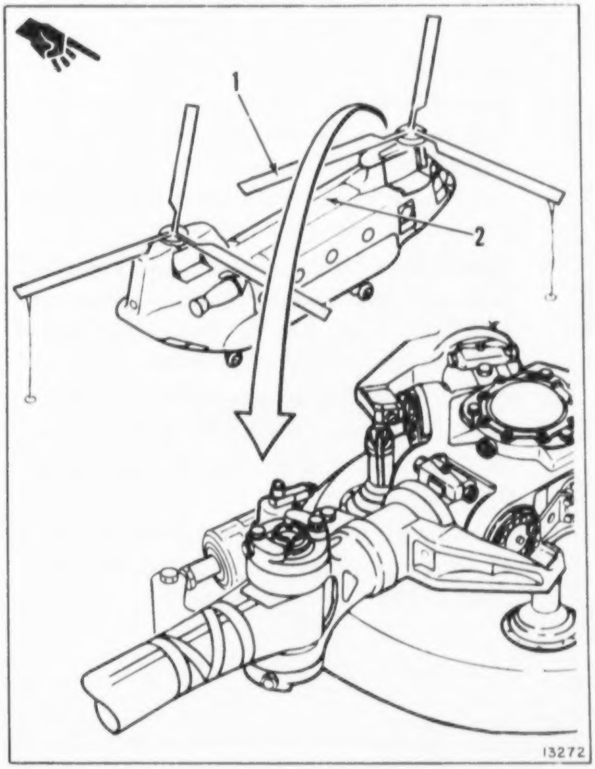
Do not allow blade to swing. Blade can cause injury or damage to components.

NOTE

- Positive retention bolts are installed in shock absorber bearings. They have a pawl which prevents nut or bolt removal unless the pawl is depressed.
- Procedure is same to inspect any shock absorber. There are six shock absorbers.

1. **Position rotary-wing blade (1) over fuselage (2).** Have helper hold blade in position.

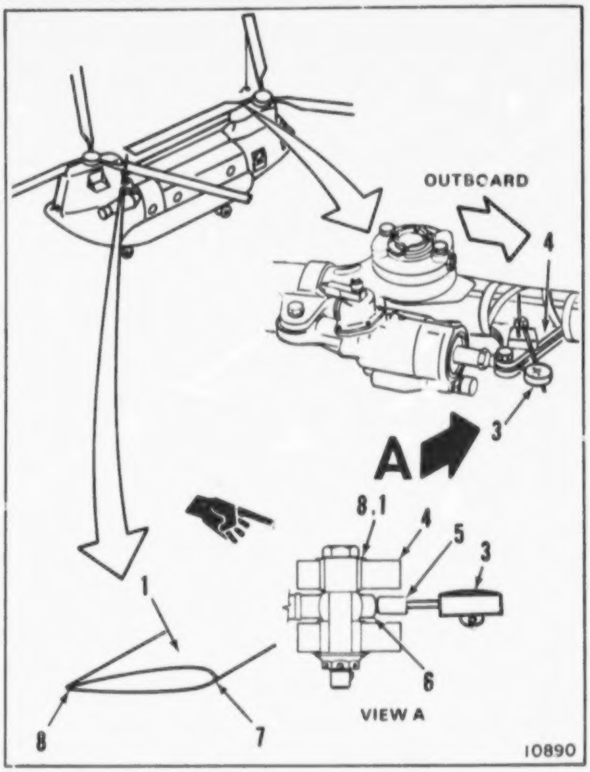
1.1. Check for oil leakage. Static leakage at any location shall not exceed a slight wetting. Leakage shall be less than one drop. If more, replace shock absorber (Tasks 5-87 and 5-93). Perform operational leakage inspection (Task 1-58).



GO TO NEXT PAGE

5-87.1 INSPECT SHOCK ABSORBER (Continued) 5-87.1

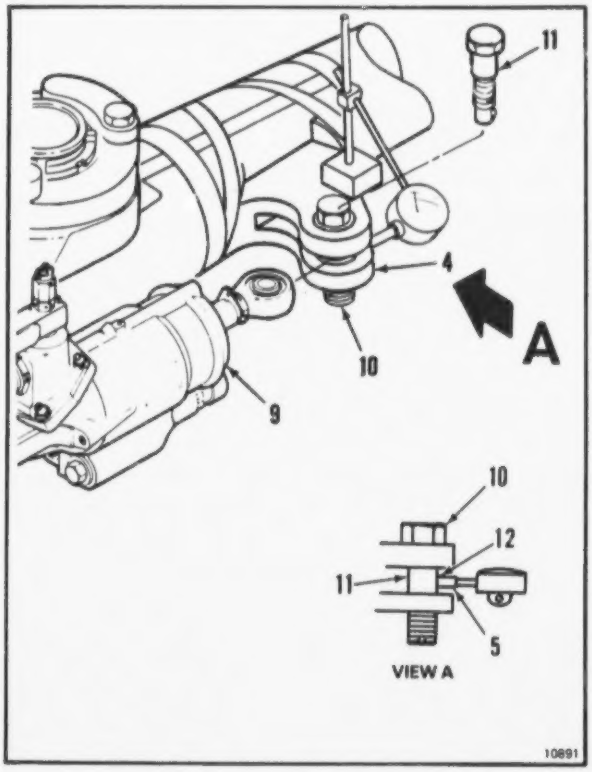
2. Mount dial indicator (3) on outboard bracket (4). **Position indicator plunger (5) against outboard end of rod end (6),** at mid-stroke of plunger. Align with rod end axis.
3. **Record indicator (3) reading.**
4. Have helper **apply force to tip of blade (1)** at **leading edge (7).** Blade should just move. **Record indicator (3) reading A.**
5. Have helper **apply force to tip of blade (1)** at **trailing edge (8).** Blade should just move. Record indicator (3) reading B.
6. **Subtract reading B of step 5, from reading A of step 4. Result must not be more than 0.010 inch.** If not more, go to step 12. If more, do steps 7 thru 11 then go to step 12.



NOTE

A gap between top of bracket (4) and flange of bushing (8.1) is allowed. Bushing may contact bolt head.

7. **Disconnect shock absorber (9) at outboard bracket (4) (Task 5-87).**
8. **Check bolt (10) for wear.** Bolt bushing (11) shall be smooth with no radial wear marks. Measure diameter of bushing at several places. Use a micrometer. Minimum diameter of bushing shall be 1.090 inch.
9. **Install bolt (10) in bracket (4). Position indicator plunger (5) against shank of bolt (10).** Align with bolt axis. Use plunger with flat end (12).
10. **Check bolt (10) movement.** Attempt to move bolt toward, then away from plunger (5). **Movement shall not be more than 0.0015 inch.**
11. If results from steps 9 and 10 are not cause of excess movement, replace rod end (6) (Task 5-88).



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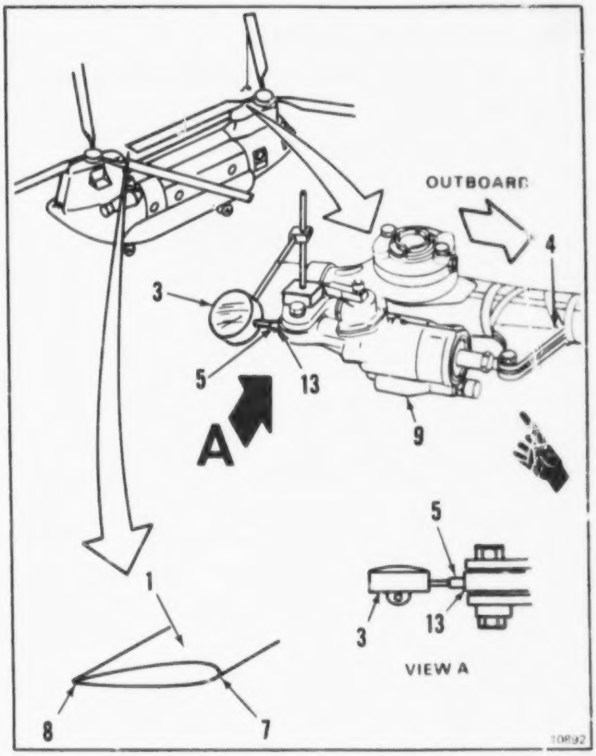
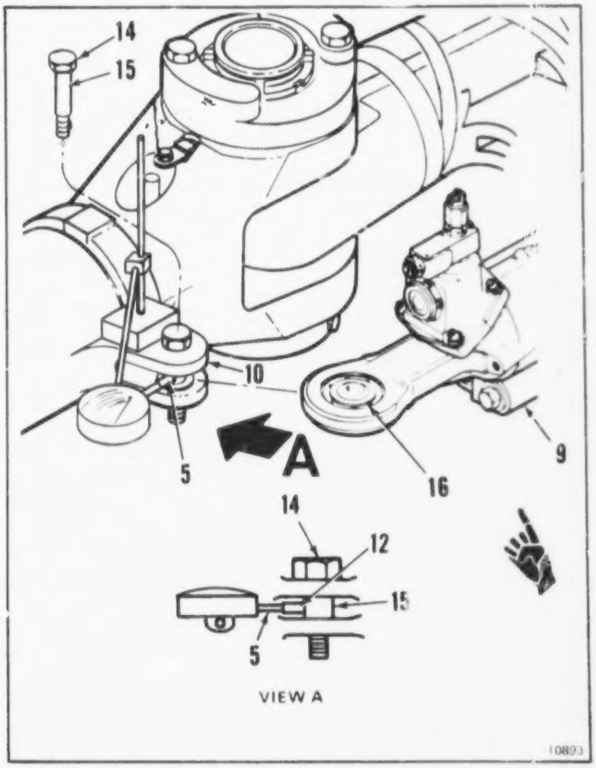
12. **Connect shock absorber (9) at bracket (4) (Task 5-93).**
13. Mount indicator (3) on inboard lug (10). **Position indicator plunger (5) against inboard end (13) of absorber (9),** at mid-stroke of plunger. Align with absorber axis.
14. **Record indicator (3) reading.**
15. Have helper **apply force to tip of blade (1) at leading edge (7).** Blade should just move. Record indicator (3) reading C.
16. Have helper **apply force to tip of blade (1) at trailing edge (8).** Blade should just move. Record indicator reading D.
17. **Subtract reading D of step 16 from reading C of step 15. Result must not be more than 0.010 inch** . If not more, go to step 23. If more, do steps 18 thru 22, then go to step 23.



18. **Disconnect absorber (9) at unboard lug (10) (Task 5-87).**
19. **Check bolt (14) for wear.** Bolt shank (15) shall be smooth, with no radial wear marks.
20. **Install bolt (14) in lug (10). Position indicator plunger (5) against bolt shank (15).** Align with bolt axis. Use plunger with flat end (12).
21. **Check bolt (14) movement.** Attempt to move bolt toward, then away from plunger (5). **Movement shall not be more than 0.0015 inch.**
22. If results from steps 19 and 21 are not cause of excess movement, replace absorber inboard bearing (16) (Tasks 5-89.2).
23. **Connect shock absorber (9) at inboard lug (10) (Task 5-93).**



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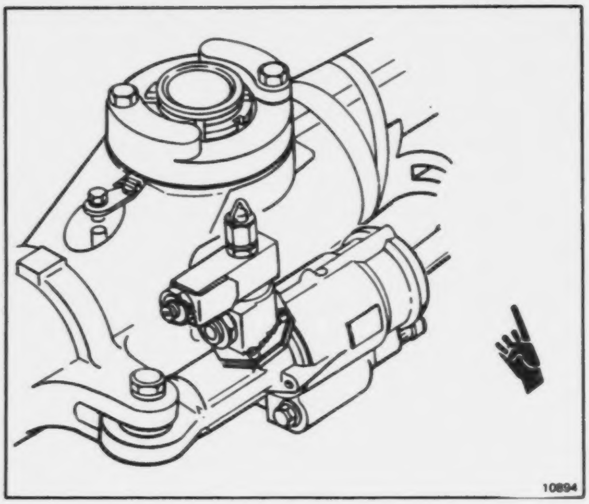
5-87.1 INSPECT SHOCK ABSORBER (Continued) 5-87.1

FOLLOW-ON MAINTENANCE:

Remove tiedown lines from blades (Task 1-26).

Close work platforms (Task 2-2).



END OF TASK

5-88 REMOVE SHOCK ABSORBER ROD-END 5-88

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692

Wrench 1 5/16-Inch

Materials:

None

Personnel Required:

Medium Helicopter Repairer

Equipment Condition:

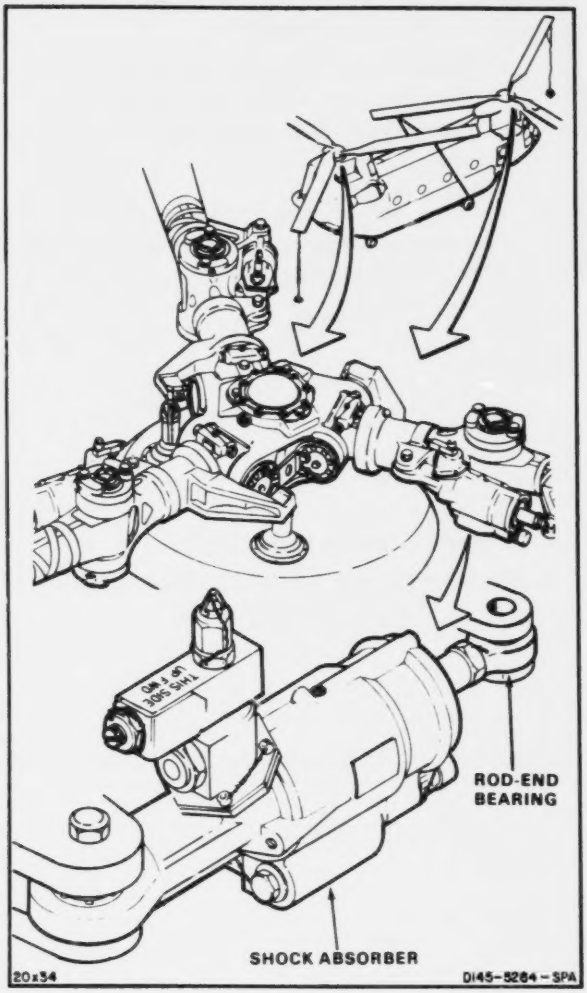
Battery Disconnected (Task 1-39)

Electrical Power Off

Hydraulic Power Off

Forward or Aft Work Platform Open (Task 2-2)

Shock Absorber Disconnected (Task 5-87)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ROD-END BEARING
SHOCK ABSORBER
20x34
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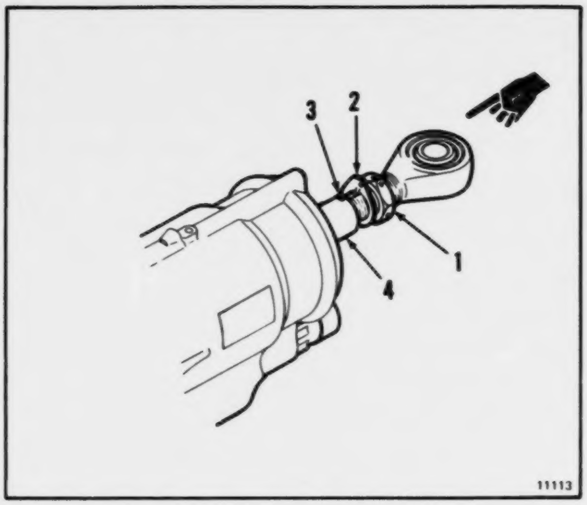
5-88 REMOVE SHOCK ABSORBER ROD-END (Continued) 5-88

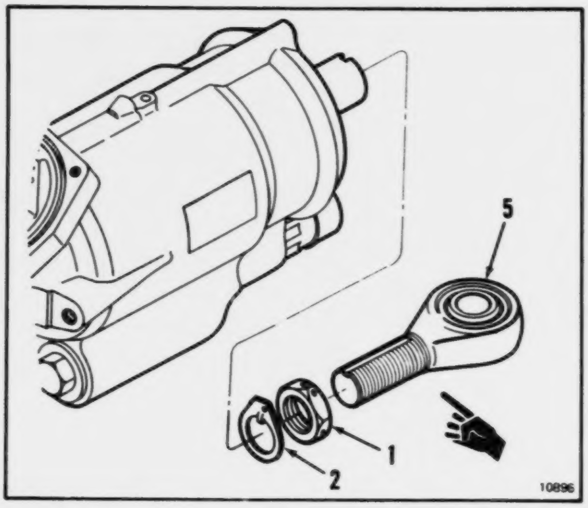
NOTE

Procedure is same to remove rod end from any shock absorber. Forward rotary-wing head shock absorber is shown here.

1 Remove lockwire from rod end nut (1). **Loosen nut. Move locking washer (2) away from notch (3)** in piston (4).



2. **Remove rod end (5).**
3. Remove locking washer (2) and nut (1).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-88.1 REMOVE SHOCK ABSORBER ROD END BEARING (AVIM) 5-88.1

INITIAL SETUP

Applicable Configurations:
All

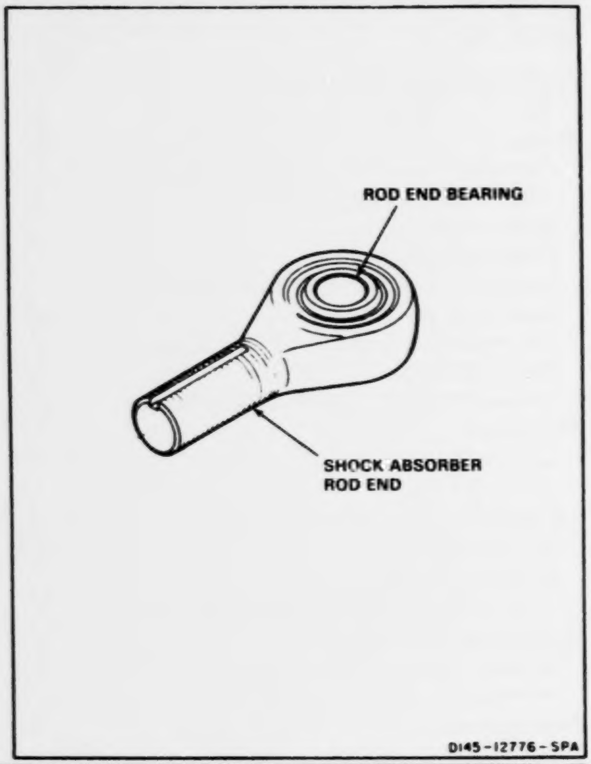
Tools:
Arbor Press
Pusher (Appx E-41)

Materials:
None

Personnel Required:
Medium Helicopter Repairer

References:
Appendix E
TM 55-1500-322-24

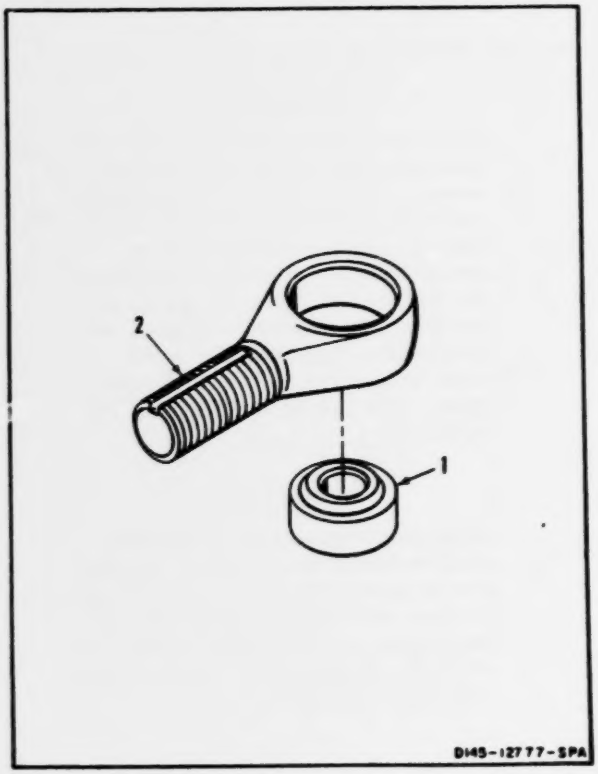
Equipment Condition:
Off Helicopter Task


ROD END BEARING
SHOCK ABSORBER ROD END
D145-12776-SPA

Remove bearing (1) from rod end (2). Use arbor press and adapter (Appx E-41) (TM 55-1500-322-24).

FOLLOW-ON MAINTENANCE:

None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END OF TASK

5-88.2 INSTALL SHOCK ABSORBER ROD END BEARING (AVIM) 5-88.2

INITIAL SETUP

Applicable Configurations:

All

Tools:

Technical Inspection Tool Kit, NSN 5180-00-323-5114
Arbor Press
Pusher (Appx E-41)
Styrofoam Container or Equivalent
Vise, Soft Jaws
Dial Indicating Scale, 0 to 100 Pounds
Gloves (E187)
Torque Wrench, 0 to 150 Inch-Pounds

Materials:

Solvent (E162)
Cloths (E120)
Kevlar Gloves (E186)
Dry Ice (E92)
Methanol (E243)
Liquid Nitrogen (E247) (Alternate Coolant)

Personnel Required:

Medium Helicopter Repairer
Inspector

References:

TM 55-1500-322-24
TM 55-1520-240-23P

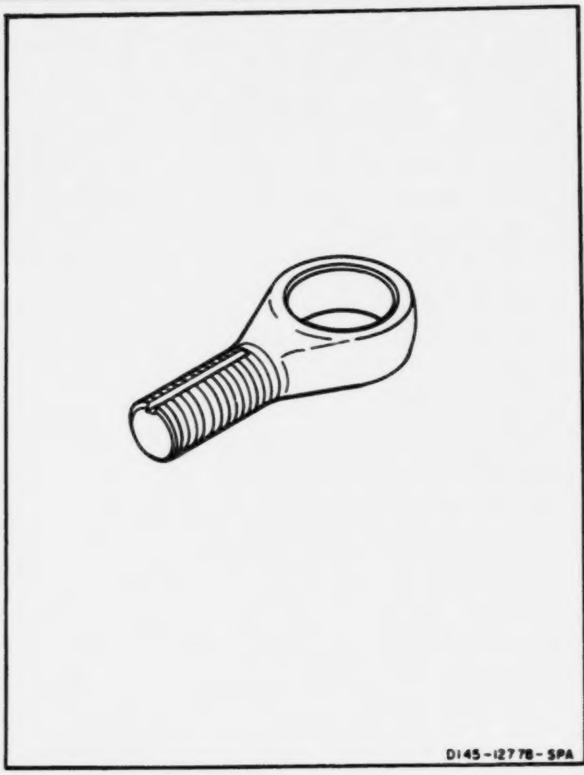
General Safety Instructions:

WARNING

Carbon dioxide (dry ice) (E92) in methanol (E243) is flammable, causes severe burns (frost bite), and gives off toxic fumes. Use only in well-ventilated area, away from heat and open flame. Do not get in eyes, on skin, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.

WARNING

Liquid nitrogen (E247) causes severe burns (frost bite). Do not get in eyes, on skin, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.


D145-12778-SPA

WARNING

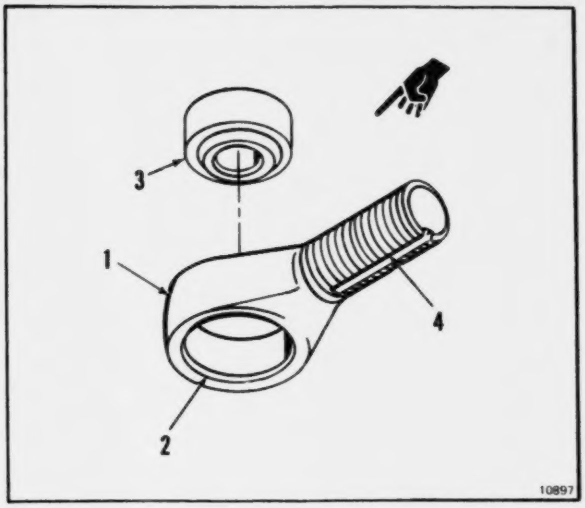
Wear kevlar gloves when handling chilled parts. Chilled parts can injure unprotected skin.

WARNING

Dry cleaning solvent (E162) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

GO TO NEXT PAGE

5-88.2 INSTALL SHOCK ABSORBER ROD END BEARING (AVIM) (Continued) 5-88.2

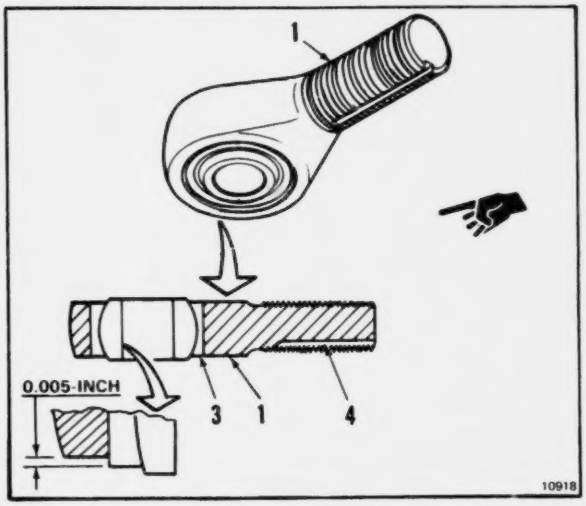


1. Wipe rod end (1) clean. Use cloth (E120) damp with solvent (E162). Wear gloves (E186).
2. Check rod end bore (2). Diameter shall be 1.7485 to 1.7489 inches .
3. **Cool bearing (3) completely** in mixture of dry ice (E92) and methanol (E243). Wear gloves. (E187)
4. Position rod end (1) with groove (4) down.

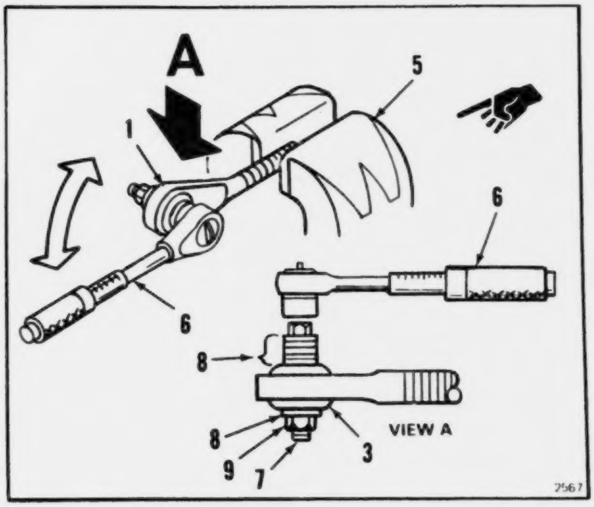
CAUTION

Do not press bearing on any surface but outer race. Bearing damage will result.

5. **Press bearing (3) into rod end (1).** Use arbor press and pusher (Appx E41) (TM 55-1500-322-24).



6. **Check that bearing (3) is flush with rod end (1),** within 0.005 inch , on same side as groove (4).



7. **Check torque needed to rotate bearing (3)** as follows:
   a. Clamp rod end (1) in soft jaw vise (5).
   b. Install torque wrench (6) on bearing (3). Use bolt (7), washers (8), and nut (9). Use enough washers to keep wrench away from rod end (1) so wrench can be pulled.
   c. Rotate torque wrench (6). Check torque. Torque shall be 10 to 60 inch-pounds.
8. Remove rod end (1) from vise (5).

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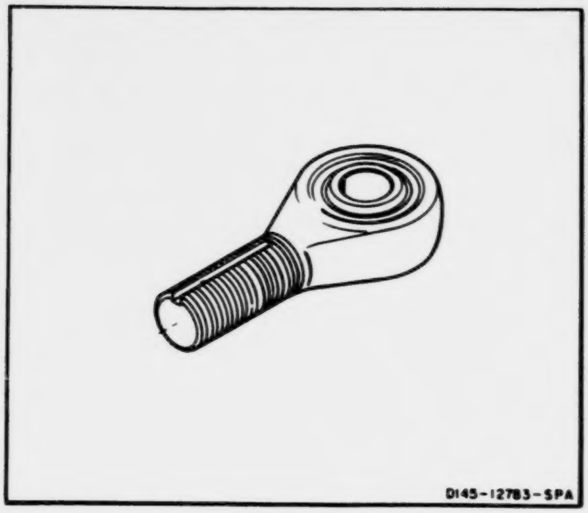
5-88.2 INSTALL SHOCK ABSORBER ROD END BEARING (AVIM) (Continued)

FOLLOW-ON MAINTENANCE:

None



D145-12783-SPA

END OF TASK

5-89 INSTALL SHOCK ABSORBER ROD-END 5-89

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Torque Wrench, 0 to 600 Foot-Pounds

Vernier Caliper

Crow's Foot, 1 5/16-Inch

Materials:

Lockwire (E230)

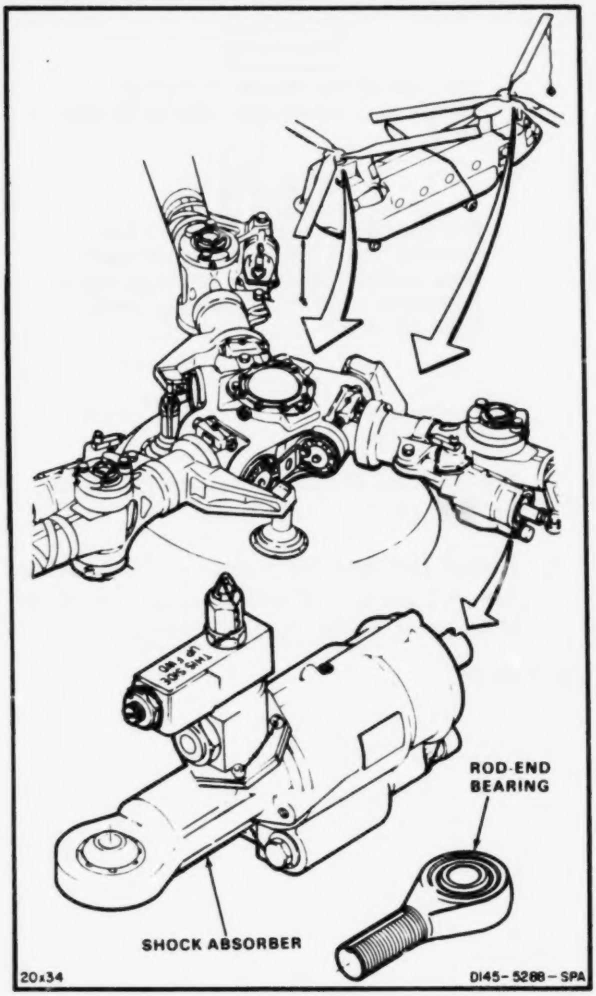
Personnel Required:

Medium Helicopter Repairer

Inspector

References:

TM 55-1520-240-23P


THIS SIDE UP FWD
ROD-END BEARING
SHOCK ABSORBER
20x34
D145-5288-SPA

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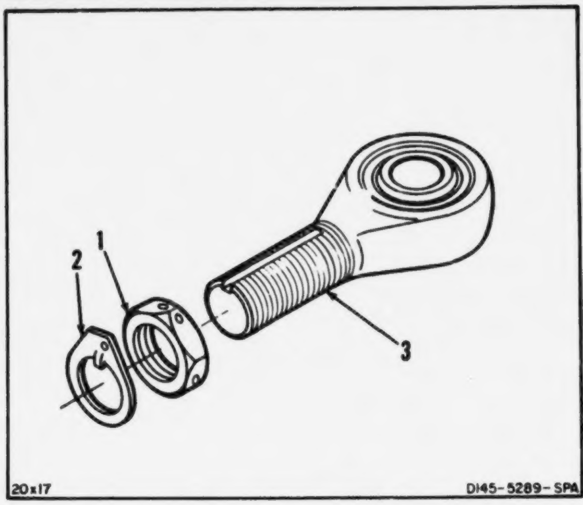
5-89 INSTALL SHOCK ABSORBER ROD-END (Continued) 5-89



WARNING

Do not allow blade to swing. Blade can injure personnel if not tied.

WARNING

Do not force nut past last full thread. Rod end can be scored and cause failure of rod end with possible loss of helicopter and loss of life.

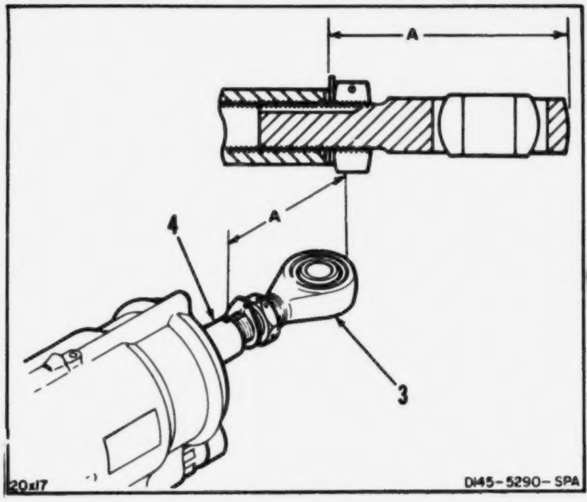
NOTE

Procedure is same to install rod end on any shock absorber.

1. **Install nut (1)** and locking washer (2) on rod end (3).

2. **Install rod end (3)** in piston (4) until dimension A from end of rod end to notched end of piston is 3.345 to 3.435 inches

INSPECT



3. Align groove (5) in rod end (3) with notch (6) in piston (4).

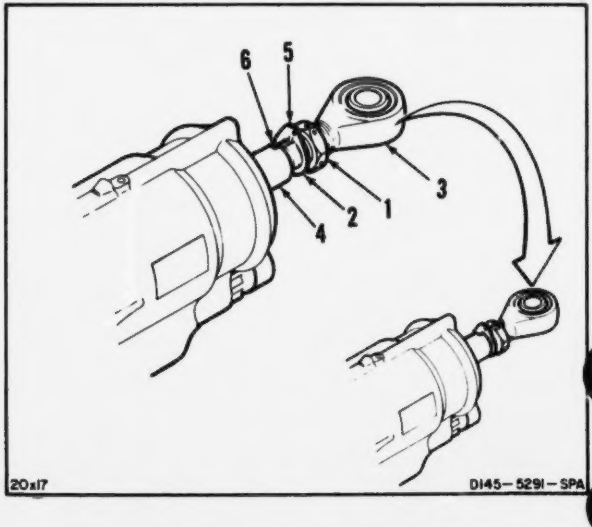
WARNING

Tang of locking washer must be positioned in piston notch, otherwise tang can be broken. This can result in rod end separation with loss of helicopter and loss of personnel.

4. **Position locking washer (2)** in notch (6). **Torque nut (1) to 140 foot-pounds . Lockwire nut and washer. Use lockwire (E230).**

FOLLOW-ON MAINTENANCE:

Install shock absorber (Task 5-93).



END OF TASK

5-89.1 REPLACE LAG DAMPER LIQUID SIGHT INDICATOR 5-89.1

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692

Materials:
Lockwire (E231)

Parts:
Packing

Personnel Required:
Medium Helicopter Repairer

Equipment Condition:
Off Helicopter Task

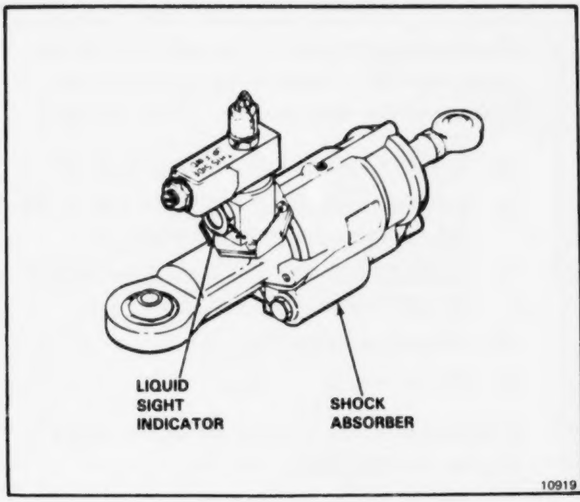
General Safety Instructions:

WARNING

Hydraulic fluid (E197) is moderately flammable. It is toxic if taken internally. It can irritate the skin. In case of contact, immediately flush skin or eyes with water. Get medical attention for eyes.

CAUTION

Do not handle shock absorber with vent valve open. Fluid can leak from open valve.



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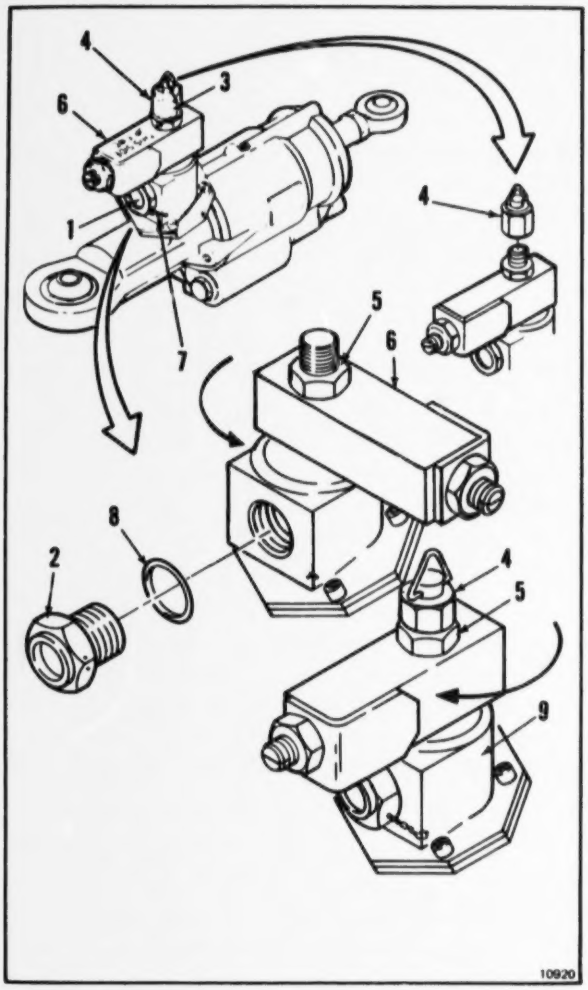
5-89.1 REPLACE LAG DAMPER LIQUID SIGHT INDICATOR (Continued) 5-89.1

1. **Check liquid level (1) in sight glass of indicator (2).** If liquid level is below the bottom of the indicator, do the following:
    a. Remove lockwire (3). Loosen cap (4).
    b. **Loosen nut (5). Turn vent valve (6)** 90 degrees counterclockwise.
    c. Remove lockwire (7). Remove indicator (2) and packing (8) from tank (9).
    d. Discard packing (8).
    e. Go to step 3.
2. **If liquid level is visible in sight glass (1),** do the following:
    a. Remove lockwire (3) and cap (4).
    b. Drain tank (9).
    c. **Loosen nut (5). Turn vent valve (6)** 90 degrees counterclockwise.
    d. Remove lockwire (7). Remove indicator (2) and packing (8) from tank (9).
    e. Discard packing (8).
3. Install replacement indicator (2) and new packing (8) in tank (9).
4. Lockwire indicator (2) to tank (9). Use lockwire (E231).
5. Rotate vent valve (6) over sight indicator (2). Tighten nut (5).
6. Tighten or install cap (4), as applicable. Lockwire cap to nut (5). Use lockwire (E231).



FOLLOW-ON MAINTENANCE:

Service lag damper (Task 5-92).

END OF TASK

5-89.2 REMOVE ROTARY-WING BLADE SHOCK ABSORBER INBOARD BEARING AND BUSHING (AVIM) 5-89.2

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Arbor Press

Materials:

None

Personnel Required:

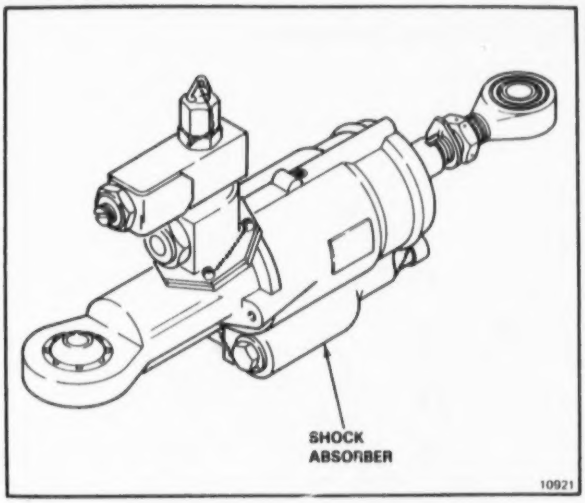
Medium Helicopter Repairer (2)

References:

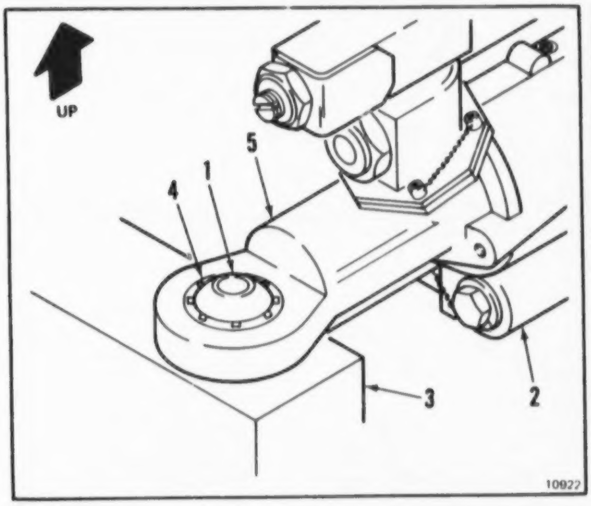
TM 55-1500-322-24

Equipment Condition:

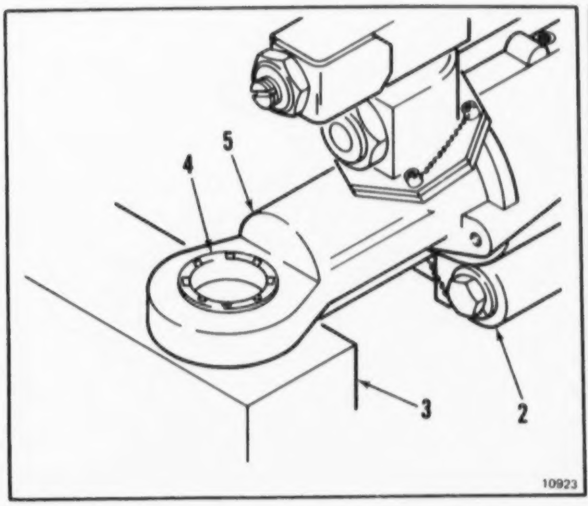
Off Helicopter Task



1. Position inboard bearing (1) of shock absorber (2) in arbor press (3) with flange of bushing (4) up.
2. **Press out bearing (1)** from housing (5). Use arbor press (3) (TM 55-1500-322-24).



3. Position housing (5) in arbor press (3) with flange of bushing (4) down.
4. **Press out bushing (4)** from housing (5). Use arbor press (3) (TM 55-1500-322-24).
5. Remove absorber (2) from arbor press (4).



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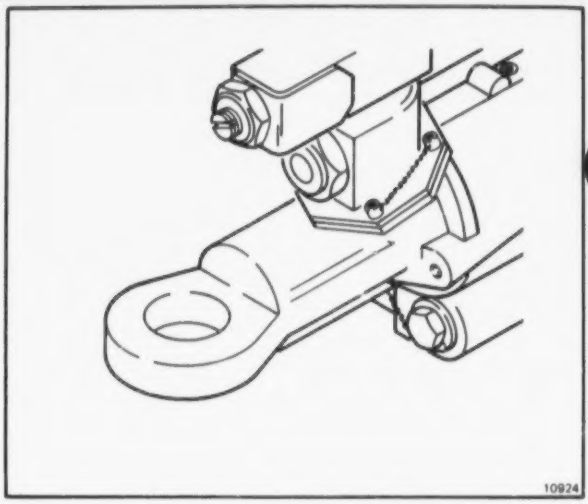
5-89.2 REMOVE ROTARY-WING BLADE SHOCK ABSORBER INBOARD BEARING AND BUSHING (AVIM) (Continued) 5-89.2

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-89.3 INSTALL ROTARY-WING BLADE SHOCK ABSORBER INBOARD BEARING AND BUSHING (AVIM) 5-89.3

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Arbor Press
Staking Die (T108)

Materials:

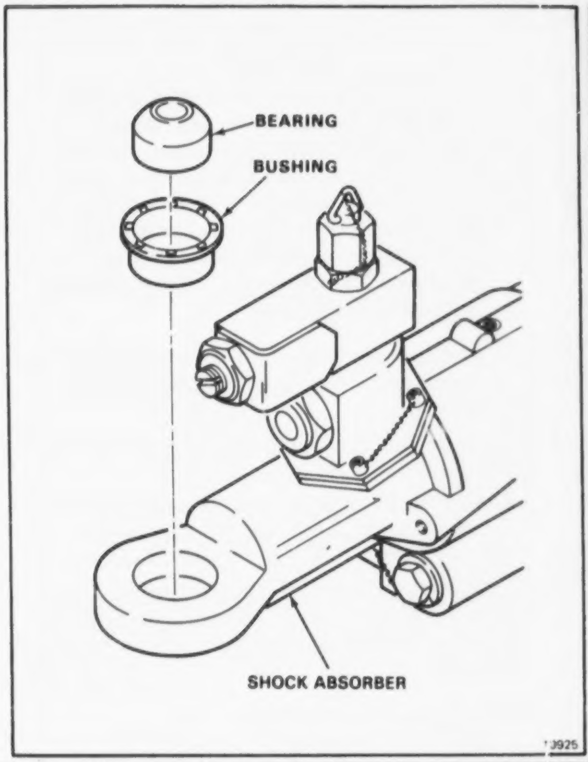
Corrosion Preventive Compound (E153)
Cleaning Cloths (E120)
Gloves (E186)
Solvent (E162)

Personnel Required:

Medium Helicopter Repairer (2)
Inspector

References:

TM 55-1500-322-24
TM 55-1520-240-23P



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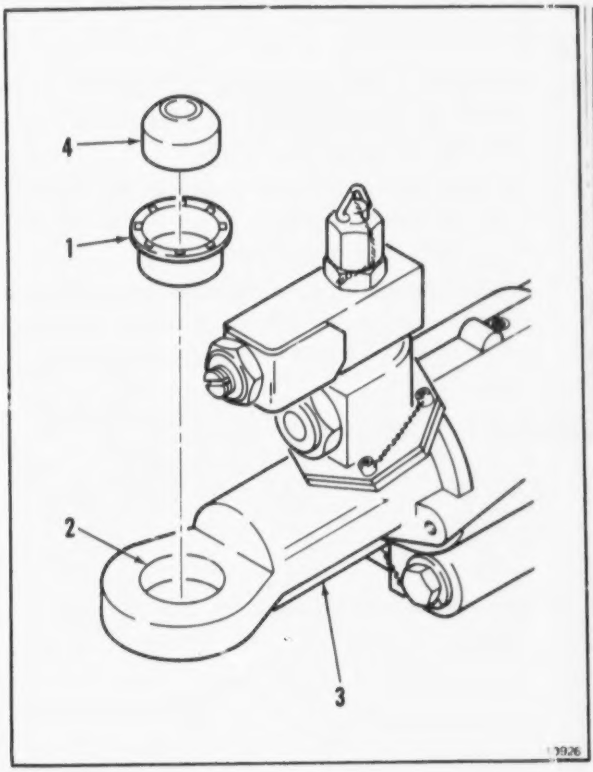
1. If bushing (1) is not being replaced, remove burrs and stake marks from inside and outside diameter of bushing.

WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes. Use gloves (E186).

2. Wipe bore (2) of shock absorber housing (3) and outer diameter of bushing (1) and bearing (4). Use cloth (E120) damp with solvent (E162). Wipe surface with dry cloth before solvent dries. Use gloves (E186).



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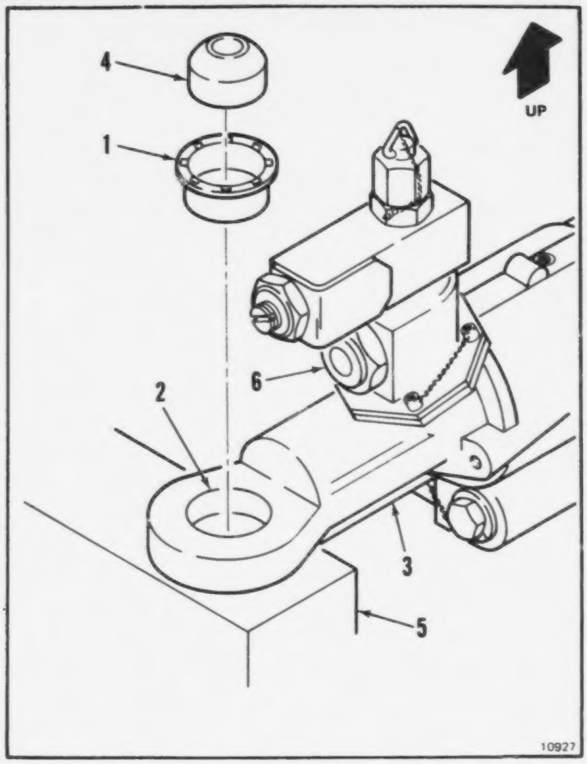
5-89.3 INSTALL ROTARY-WING BLADE SHOCK ABSORBER INBOARD BEARING AND BUSHING (AVIM) (Continued) 5-89.3

WARNING

Corrosion preventive compound (E153) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

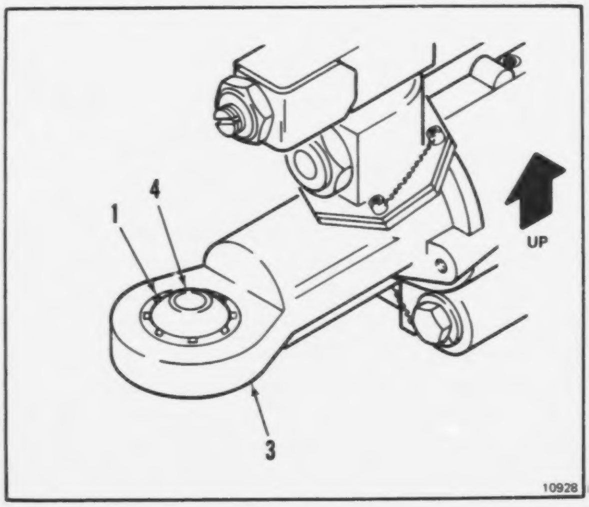
3. Apply compound (E153) to bore (2) and outer diameter of bushing (1). Wear gloves (E186).
4. Position housing (3) in arbor press (5), with sight indicator (6) up.
5. **Press bushing (1) into housing (3)** until bushing flange seats on housing. Wear gloves (E186) (TM 55-1500-322-23).
6. **Press bearing (4) into bushing (1)** until bottom outer race of bearing is flush with bottom surface of bushing (TM 55-1500-322-24).



NOTE

Inner ball of bearing extends beyond bearing outer diameter.

7. Remove excess compound (E153) from bushing (1) and housing (3). Use cloths (E120). Wear gloves (E186).
8. **Stake bushing (1) to bearing (4)** on flanged side of bushing, at six evenly spaced positions. Use staking die (T108).
9. **Stake bushing (1) to flange on opposite side** at six evenly spaced positions. Stake next to previous stake marks. Use staking die (T108).



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-90 ADJUST SHOCK ABSORBER LENGTH (AVIM) 5-90

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Setting Fixture (T106)

Torque Wrench, 0 to 600 Foot-Pounds

Open End Wrench, 1 5/16-Inch

Crowsfoot, 1 5/16-Inch

Materials:

Lockwire (E231)

Personnel Required:

67U10 Medium Helicopter Repairer

67U20 Medium Helicopter Repairer

67U30 Inspector

References:

TM 55-1520-240-23P

Equipment Condition:

Battery Disconnected (Task 1-39)

Electric Power Off

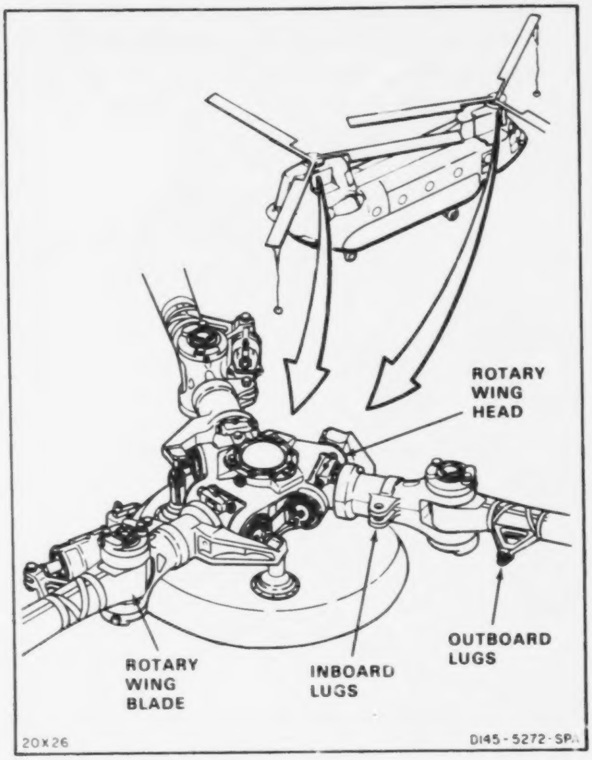
Hydraulic Power Off

Rotary-Wing Blade Positioned Over Fuselage

One Forward and One Aft Rotary-Wing Blade Tied-Down (Task 1-26)

Forward or Pylon Work Platform Open (Task 2-2)

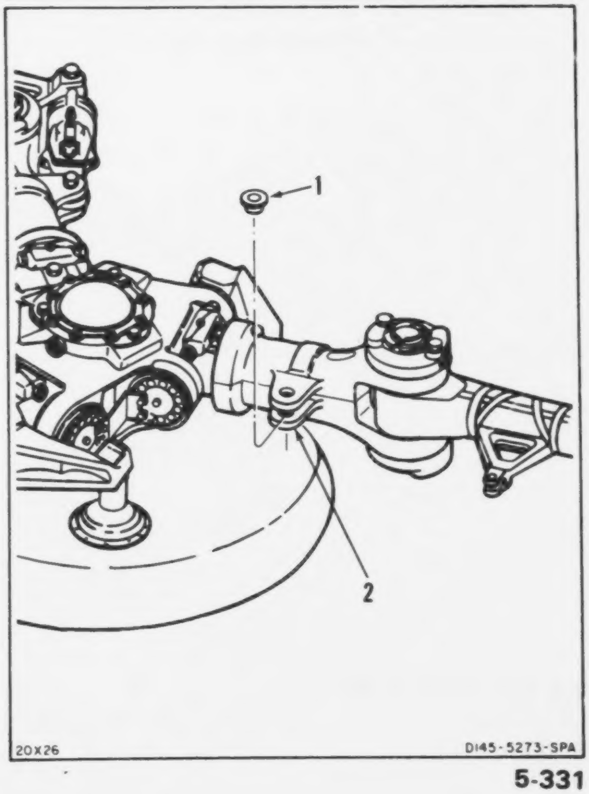
Shock Absorber Removed (Task 5-87)


ROTARY WING HEAD
ROTARY WING BLADE
INBOARD LUGS
OUTBOARD LUGS
20X26
D145-5272-SPA

NOTE

Procedure is same to adjust any shock absorber.

1. **Install sliding bushing (1)** in lower inboard lug (2).


1
2
20X26
D145-5273-SPA

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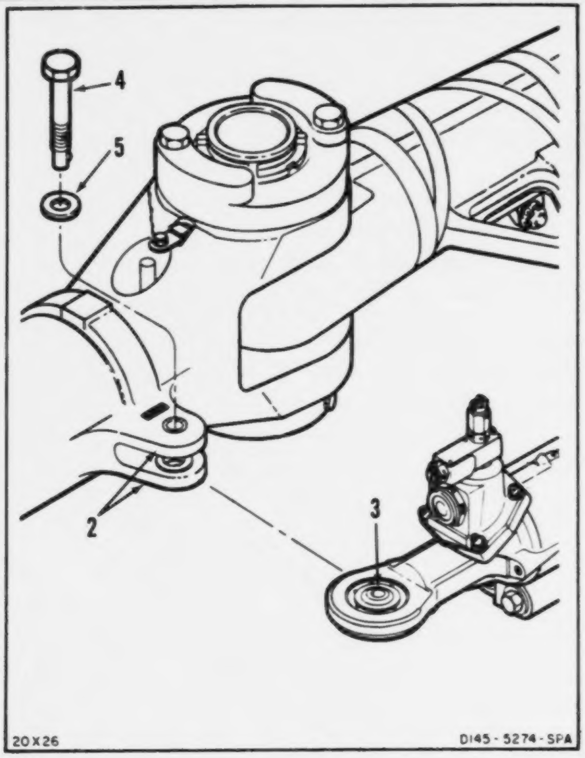
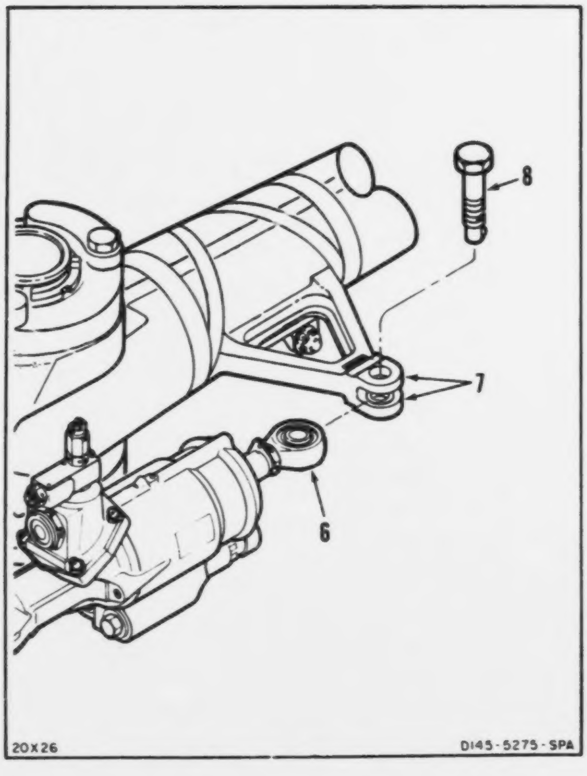
5-90 ADJUST SHOCK ABSORBER LENGTH (AVIM) (Continued) 5-90

2. Have helper **position inboard bearing (3)** between inboard lugs (2). **Install bolt (4)** and countersunk washer (5).


4
5
2
3
20X26
D145-5274-SPA

3. **Position rod-end bearing (6)** between outboard lugs (7). **Install bolt (8).**


8
7
6
20X26
D145-5275-SPA

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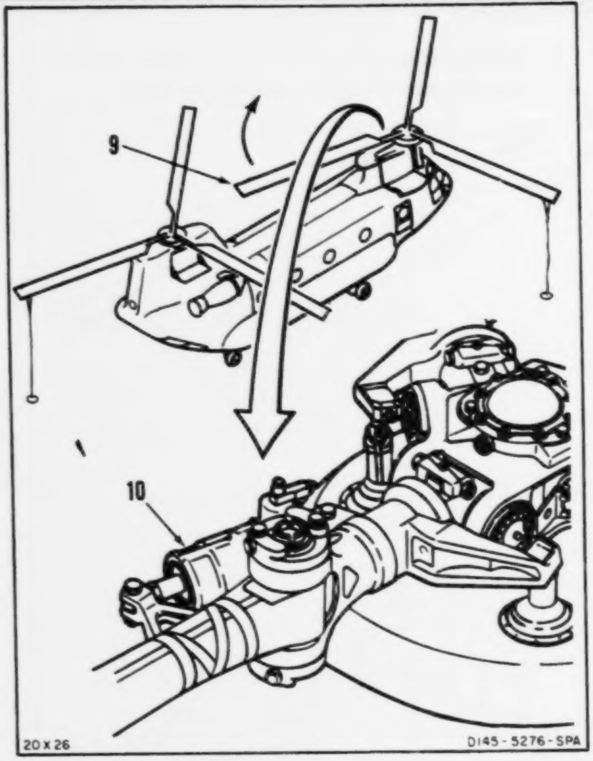
5-90 ADJUST SHOCK ABSORBER LENGTH (AVIM) (Continued) 5-90

4. **Move blade (9)** in direction of shock absorber (10) **until absorber is fully compressed.** Hold blade until it remains in place with no pressure applied.

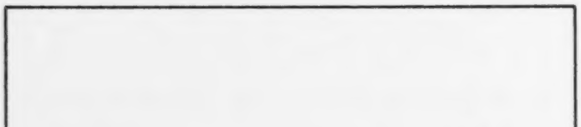
WARNING

Do not allow blade to swing. Blade can injure personnel if not tied.

5. Tie rotary-wing blade (9) to fuselage.


9
10
20X26
D145-5276-SPA

6. Have helper support shock absorber (10). **Remove bolt (8).**


8
10
20X26
D145-5277-SPA

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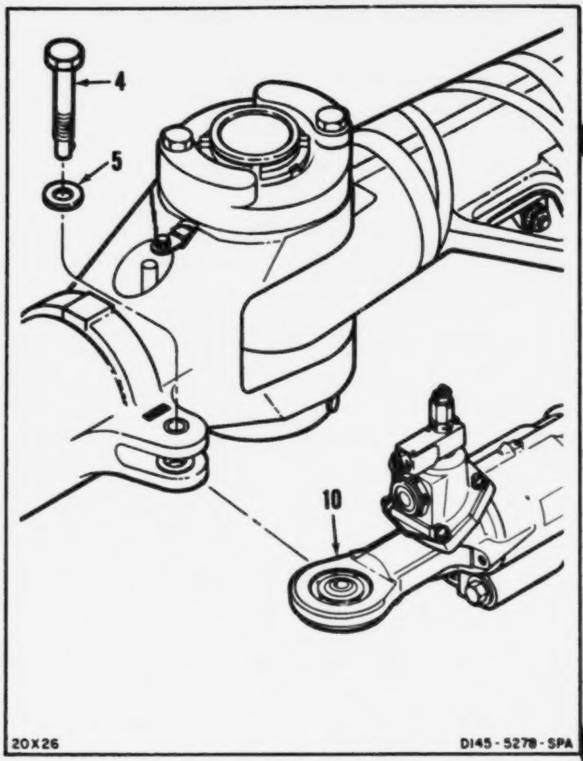
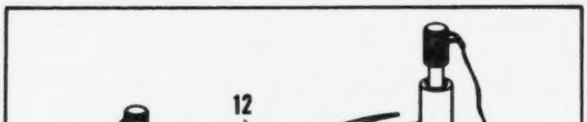
5-90 ADJUST SHOCK ABSORBER LENGTH (AVIM) (Continued) 5-90

7. **Remove bolt (4)** and countersunk washer (5). **Remove shock absorber (10).**


4
5
10
20X26
D145-5278-SPA

8. **Adjust length of shock absorber (10)** as follows:
   a. At setting fixture (T106) (12), position in-inboard bearing (3) over inboard support (11). Insert inboard pin (13) into inboard support.


12
13
13
10
3
11
20X26
D145-5279-SPA

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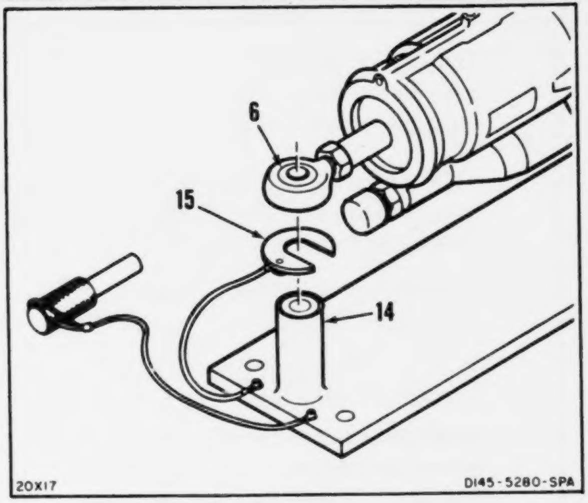
5-90 ADJUST SHOCK ABSORBER LENGTH (AVIM) (Continued) 5-90

b. Position bearing (6) over support (14).

c. Remove spacer (15) from support (14). Position bearing (6) on spacer.

NOTE

Spacer is not used to adjust this shock absorber.



CAUTION

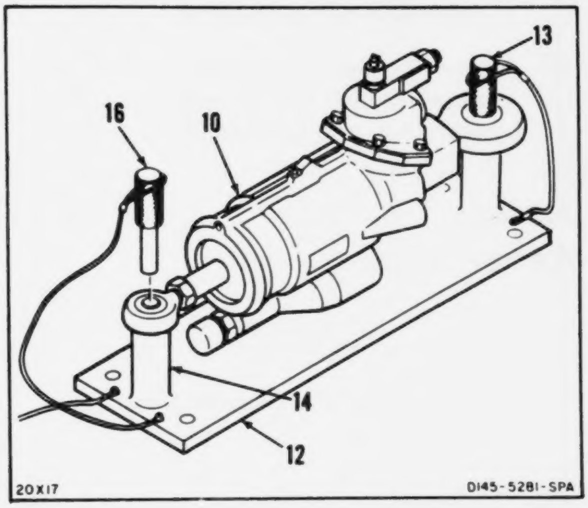
Do not lift bearing to align rod-end pin. Do not force pin into support. Do not adjust rod-end on fixture. Damage to fixture can result.

d. Insert rod-end pin (16) into rod-end support (14). Check that pin fits freely at least 3/4-inch into support.

NOTE

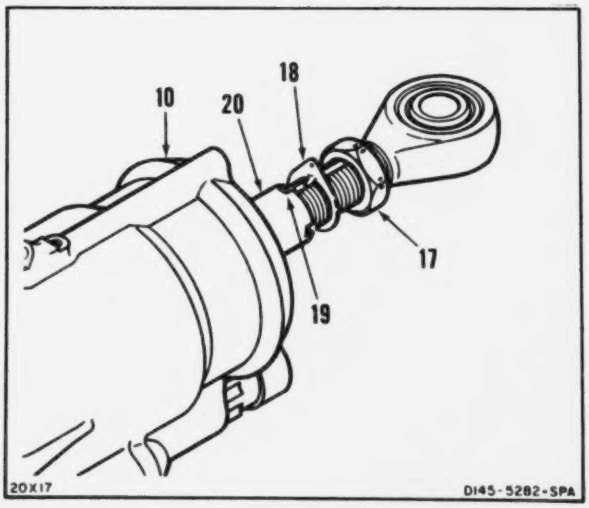
Fixture is set to nominal shock absorber length of 18.642-inches. If pin does not fit freely, shock absorber is not correct length.

e. Remove pins (13) and (16). Remove shock absorber (10) from fixture (T106) (12).



9. **If length of shock absorber (10) is not correct, adjust** as follows:

   a. Loosen nut (17), move locking washer (18) clear of notch (19) in piston (20).



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5-90 ADJUST SHOCK ABSORBER LENGTH (AVIM) (Continued) 5-90

NOTE

Turning rod-end bearing 1/4-turn to next piston notch changes shock absorber length 0.018-inch.

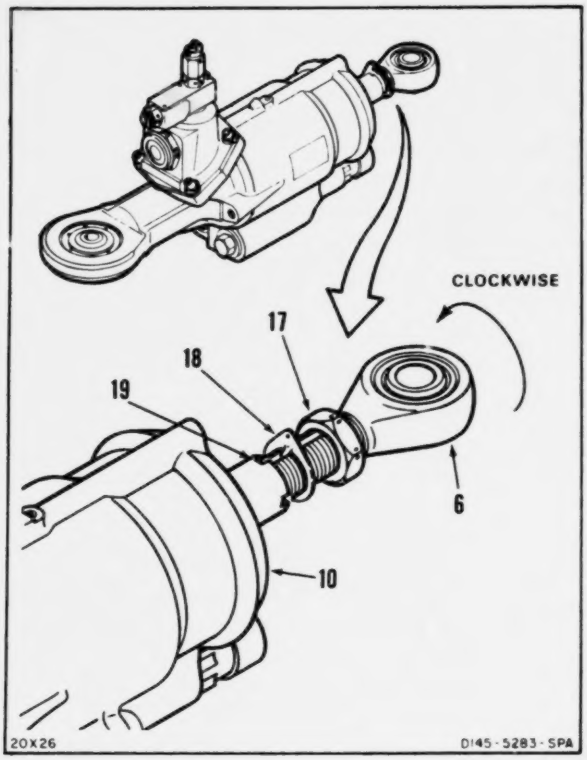
b. Turn bearing (6) clockwise to shorten shock absorber. Turn it counterclockwise to lengthen shock absorber.

c. Repeat step 8 to check length of shock absorber (10).

CAUTION

Hold piston flats with wrench when tightening nut. Movement between piston and rod-end will damage locking washer.

10. Position locking washer (18) in notch (19). **Torque nut (17) to 140 foot-pounds.** Lockwire nut. Use lockwire (E231).



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-91 PREPARE SHOCK ABSORBER FOR STORAGE OR SHIPMENT

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Container (T107)

Materials:

Hydraulic Fluid (E197)
Cloth (E120)
Barrier Material (E80)
Waterproof Tape (E395)
Lockwire (E231)

Personnel Required:

67U10 Medium Helicopter Repairer

Equipment Condition:

Off Helicopter Task

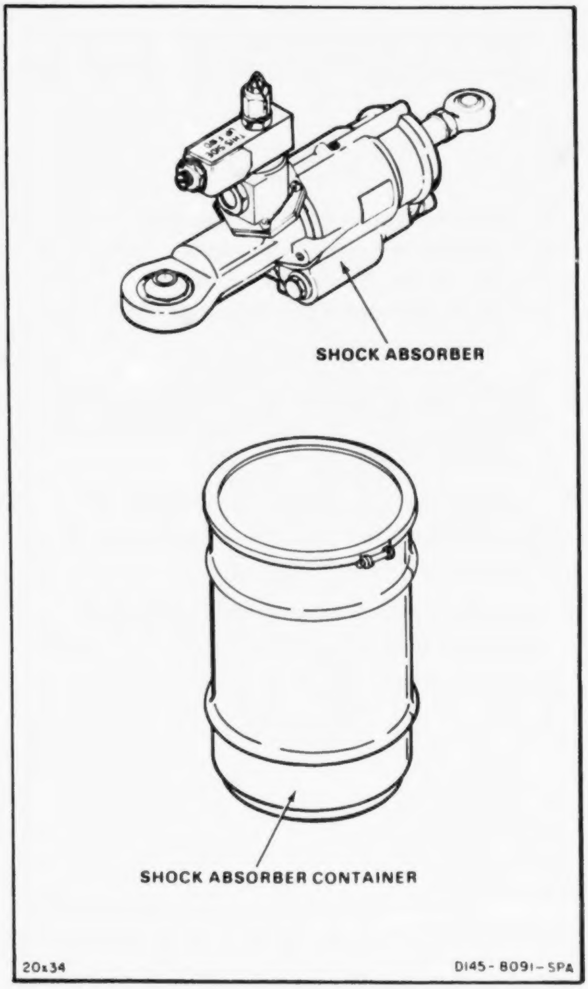
General Safety Instructions:

WARNING

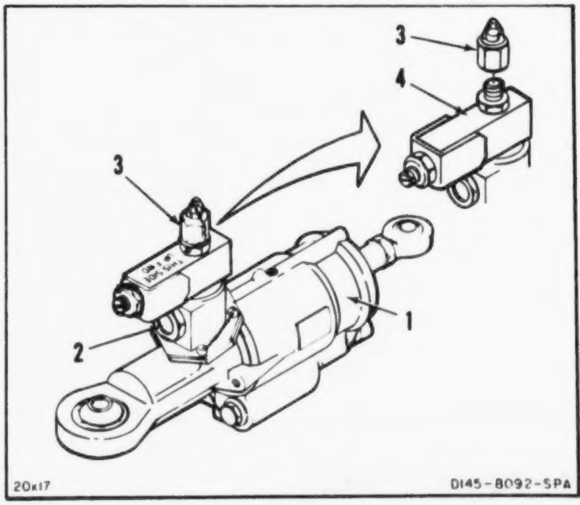
Hydraulic fluid (E197) is moderately flammable. It is toxic if taken internally. It can irritate the skin. In case of contact, immediately flush skin or eyes with water. Get medical attention for eyes.

CAUTION

Do not handle shock absorber with vent valve open. Fluid can leak from open valve.



1. **Check fluid level in shock absorber (1).** If fluid level is not within midpoint of sight indicator (2), service shock absorber as follows:
   a. Remove lockwire from cap (3). Remove cap.
   b. Add hydraulic fluid (E197) to tank (4). Check that fluid level is within midpoint of indicator (2).
   c. Install cap (3). Lockwire cap. Use lockwire (E231).



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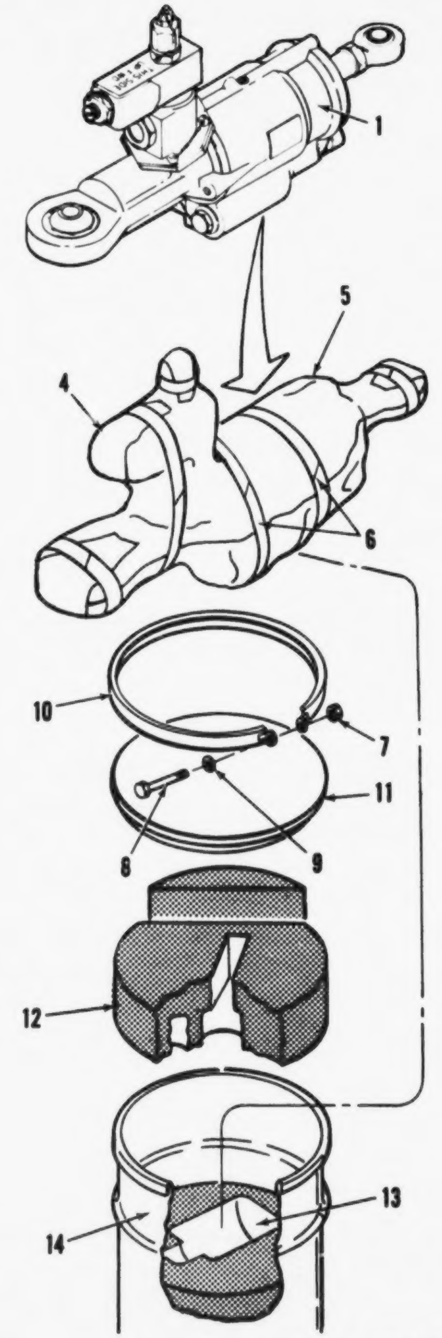
5-91 PREPARE SHOCK ABSORBER FOR STORAGE OR SHIPMENT (Continued) 5-91

2. Wipe shock absorber (1) clean, including unpainted surfaces. Use cloth (E120) damp with hydraulic fluid (E197).

CAUTION

Do not apply preserving compounds as grease to shock absorber. Removal requires solvent which can damage dry-type bearings.

3. **Wrap shock absorber (1).** Use barrier material (E80) (5). Secure barrier material with tape (E395) (6).
4. Remove nut (7), bolt (8), and washer (9). Remove lockring (10). Remove cover (11). Remove upper cushion (12).
5. **Position shock absorber (1) in lower cushion (13)** of container (T107) (14) with tank (4) up.



20x51

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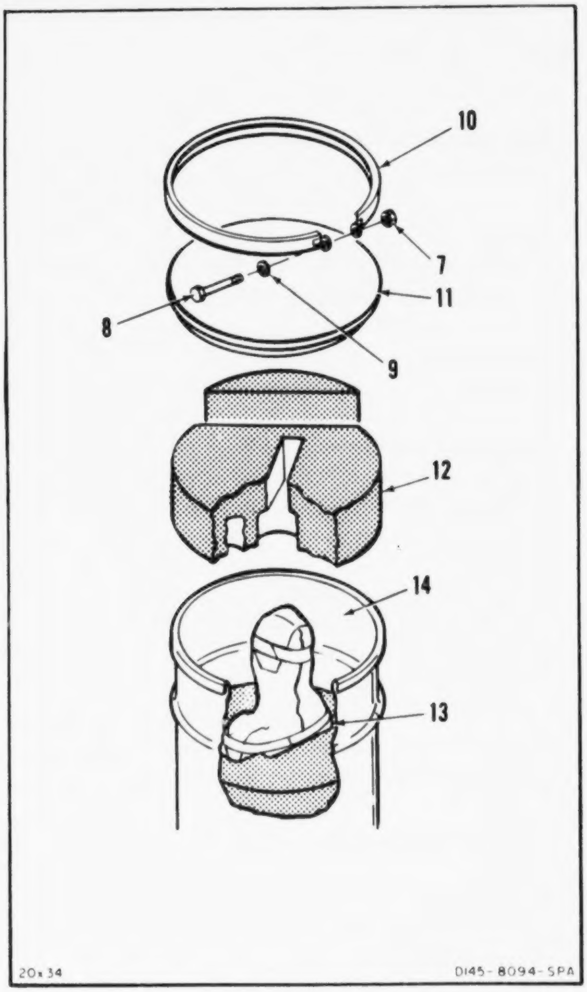
GO TO NEXT PAGE

5-91 PREPARE SHOCK ABSORBER FOR STORAGE OR SHIPMENT (Continued) 5-91

6. **Position upper cushion (12)** on lower cushion (13).
7. **Position cover (11) on container (T107) (14).** Install lockring (10), bolt (8), washers (9), and nut (7).
8. Label container (T107) (14) with part number and reason for removal, if required.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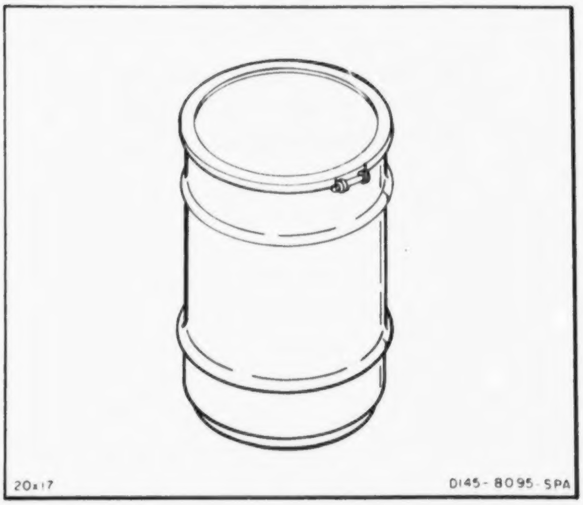
FOLLOW-ON MAINTENANCE:

None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END OF TASK

5-92 PLACE SHOCK ABSORBER IN SERVICE 5-92

INITIAL SETUP

Applicable Configurations:
All

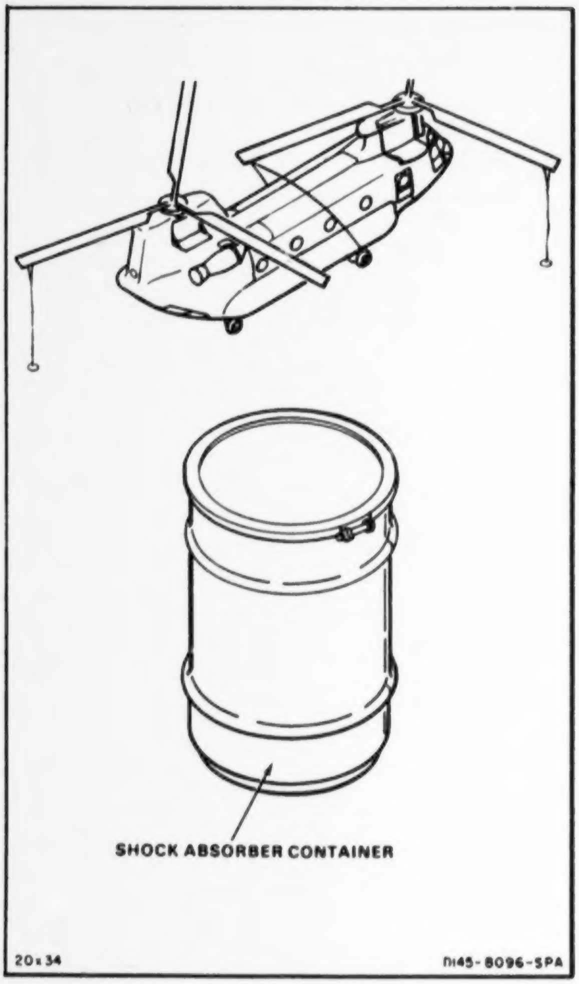
Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Materials:
None

Personnel Required:
67U10 Medium Helicopter Repairer (4)
67U20 Medium Helicopter Repairer
67U30 Inspector

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied Down, Blade Without Shock Absorber Tied To Two Landing Gear Shackles (Task 1-26)
Work Platforms Open (Task 2-2)

References:
TM 55-1520-240-23P
Task 5-93



CAUTION

Do not clean shock absorber with any kind of solvent. Damage to dry-type bearings can result.

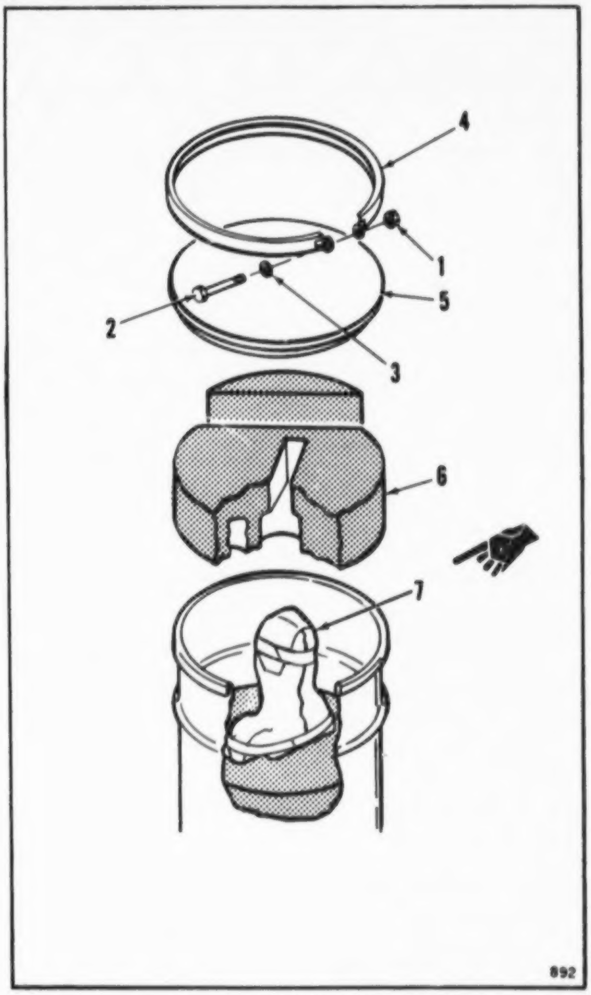
GO TO NEXT PAGE

5-92 PLACE SHOCK ABSORBER IN SERVICE (Continued) 5-92

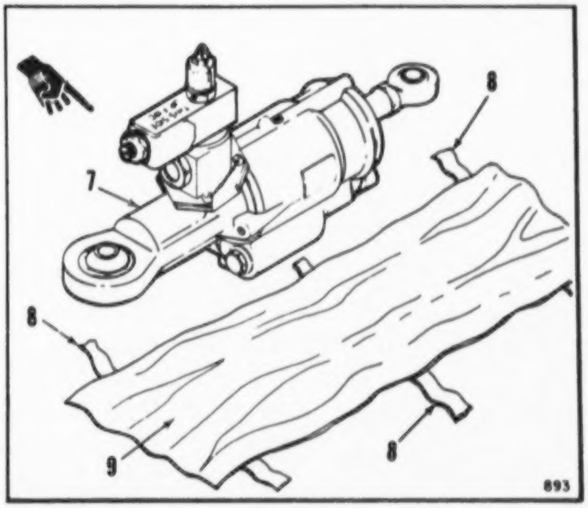
NOTE

Procedure is same to place any shock absorber in service. There are six shock absorbers.

1. Remove nut (1), bolt (2), and washer (3). Remove lockring (4).
2. Remove lid (5). Remove upper cushion (6). **Remove shock absorber (7).**



3. **Remove tape (E395) (8) and barrier material (E80) (9)** from shock absorber (7) (Task 5-93).



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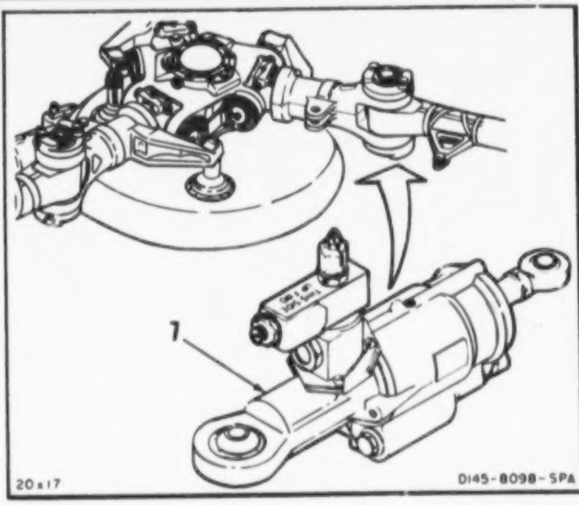
5-92 PLACE SHOCK ABSORBER IN SERVICE (Continued) 5-92

4. **Install shock absorber (7)** (Task 5-93).

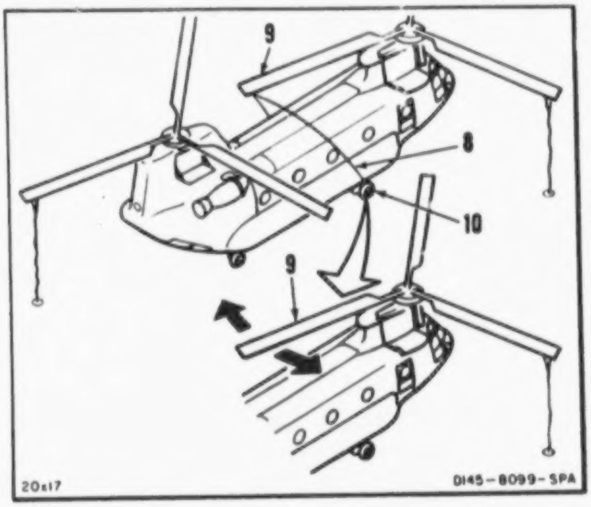


5. **Bleed air from shock absorber** as follows:
   a. Remove ties (8) from blade (9) to landing gear shackles (10).

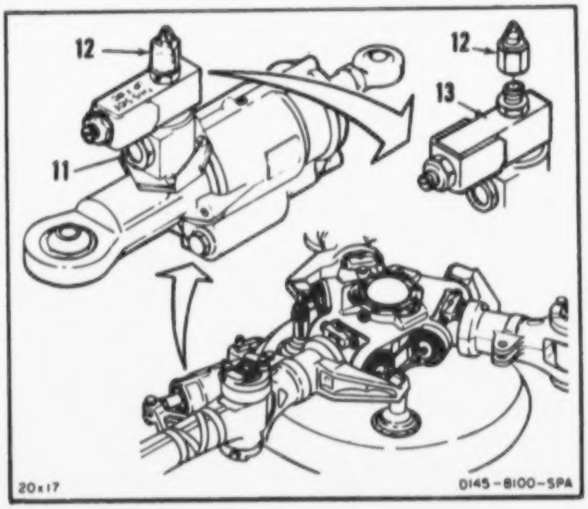
   NOTE

   Blade is used as lever to move shock absorber.

   b. Have helpers lift and move blade (9). Move to full lead and full lag positions. Repeat cycle five times. Have helpers lower blade.



   c. Check that fluid level is within center of sight indicator (11). If fluid is within center, go to Follow-On Maintenance.
   d. If fluid is not visible in center of indicator (11), remove lockwire and cap (12).
   e. Add hydraulic fluid (E197) to tank (13) until level is at center of indicator (11). Install cap (12). Lockwire cap. Use lockwire (E231).



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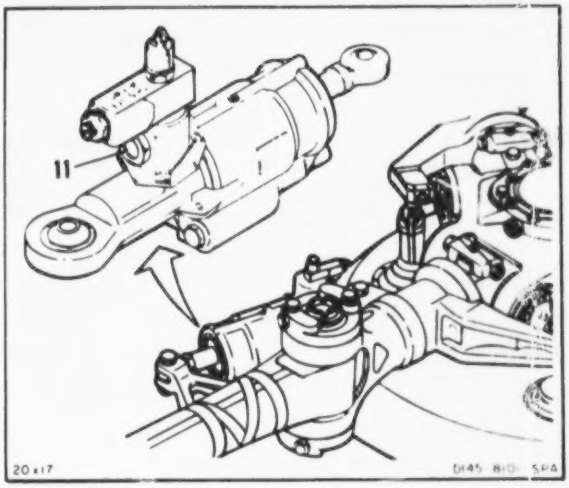
5-92 PLACE SHOCK ABSORBER IN SERVICE (Continued) 5-92



f. Repeat step b.

NOTE

Fluid level must remain in center of indicator after five shock absorber cycles.

g. Check that fluid has not dropped below indicator (11).

FOLLOW-ON MAINTENANCE:

None

5-93 INSTALL SHOCK ABSORBER 5-93

INITIAL SETUP

Applicable Configurations:
All

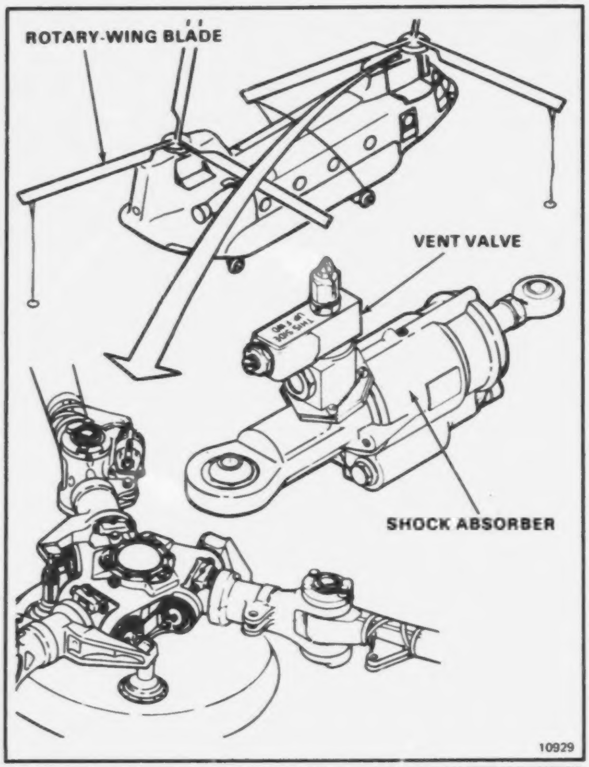
Tools:
- Aircraft Mechanic Tool Kit, NSN 5180-00-323-4692
- Torque Wrench, 0 to 600 Foot-Pounds
- Torque Wrench, 0 to 150 Inch-Pounds
- Micrometer
- Rotary-Wing Blade Sling (T35)

Materials:
- Antiseize Compound (E75)
- Cloth (E120)
- Dry Cleaning Solvent (E162)
- Hydraulic Fluid (E197)
- Lockwire (E231)
- Gloves (E186)

Parts:
- Cotter Pins

Personnel Required:
- Medium Helicopter Repairer (6)
- Inspector

References:
TM 55-1520-240-23P



NOTE

Procedure is same to install any shock absorber. There are six shock absorbers.

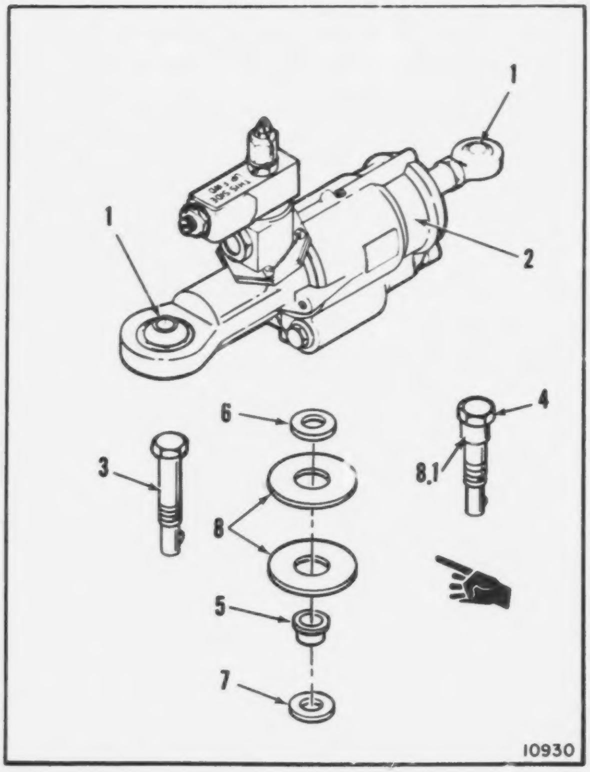
1. Clean bearing bores (1) of shock absorber (2). Use cloth (E120).

WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

2. Clean bolts (3 and 4), bushing (5), and washers (6, 7, and 8). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).

2.1. Measure bushing (8.1) of bolt (4) at several places. Use a micrometer. Minimum diameter of bushing shall be 1.090 inch.



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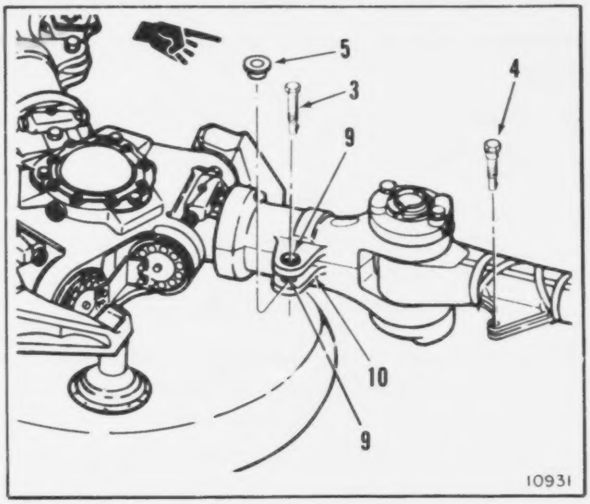
5-93 INSTALL SHOCK ABSORBER (Continued) 5-93

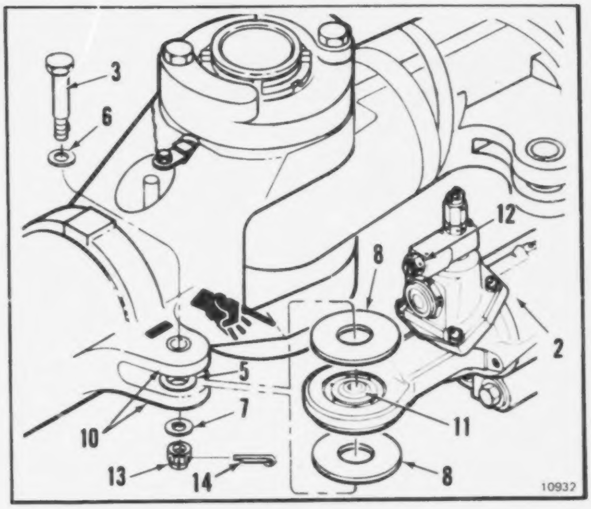


WARNING

Antiseize compound (E75) can form toxic vapors if exposed to flame. Use in well-ventilated area, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. Coat two bushings (9), the shank of bolts (3 and 4), and sliding bushing (5). Use a very light coat of antiseize compound (E75). Wear gloves (E186).
4. Have qualified inspector verify that sliding bushing (5) is installed in lower inboard lug (10). Install if necessary.

CONNECT SHOCK ABSORBER AT INBOARD LUGS



WARNING

Make sure blade is supported by sling during installation. Otherwise, damage to helicopter or injury to personnel could result.

5. **Install shock absorber (2) with bearing (11)** and two Teflon washers (8) between inboard lugs (10). Face sight indicator (12) up and inboard.
6. Install countersunk washer (6) on bolt (3), with countersink toward bolthead.

CAUTION

Positive retention bolts are installed in shock absorber bearings. These bolts require special torque (Task 1-14). Do not torque bolt until a qualified inspector has verified that sliding bushing (5) is installed.

7. Align holes in lugs (10) and bearing (11). Install bolt (3), washer (7), and nut (13). **Torque nut to 110 to 250 foot-pounds.** Install cotter pin (14). Washer (7) may be added to align cotter pin.

7.1. Check that Teflon washers (8) are not caught between bearing (11) and bushings (5 or 9). After torque application, the Teflon washers must be free to turn.

GO TO NEXT PAGE

CONNECT SHOCK ABSORBER AT OUTBOARD LUGS

8. Check that bushing (15) is installed in lower lug (16).

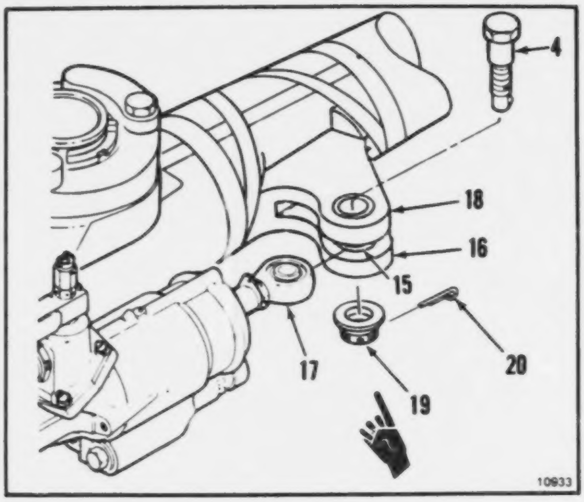
NOTE

Positive retention bolts are installed in shock absorber bearings. These bolts require special torque (Task 1-14).

9. **Install rod-end bearing (17) between outboard lugs (16 and 18).** Align holes in lugs and bearing. Install bolt (4).
10. **Install nut (19). Torque nut to 60 to 100 foot-pounds.** Install cotter pin (20).

NOTE

A washer may be added under the nut for cotter pin alignment.



5-93 INSTALL SHOCK ABSORBER (Continued) 5-93

11. If required, **position vent valve (21) for forward or aft installation** as follows:

NOTE

On forward head, vent valve marking THIS SIDE UP FWD must face up. On aft head, vent valve marking THIS SIDE UP AFT must face up.

a. Remove lockwire. Remove bolt fitting (22) and valve body (23). Allow body to lift from tank (24) and turn with fitting.

b. Remove packing (25). Remove fitting (22) and packing (26).

c. Coat fitting (22), hole (27), and packings (25 and 26). Use hydraulic fluid (E197).

CAUTION

Do not install packings in wrong places. Packing at head of fitting is thicker and smaller in diameter than packing under body. Leakage can occur if packings are installed in wrong places.

d. Install packing (26) on fitting (22).

e. Position body (23) with markings up for head where shock absorber (28) is installed.

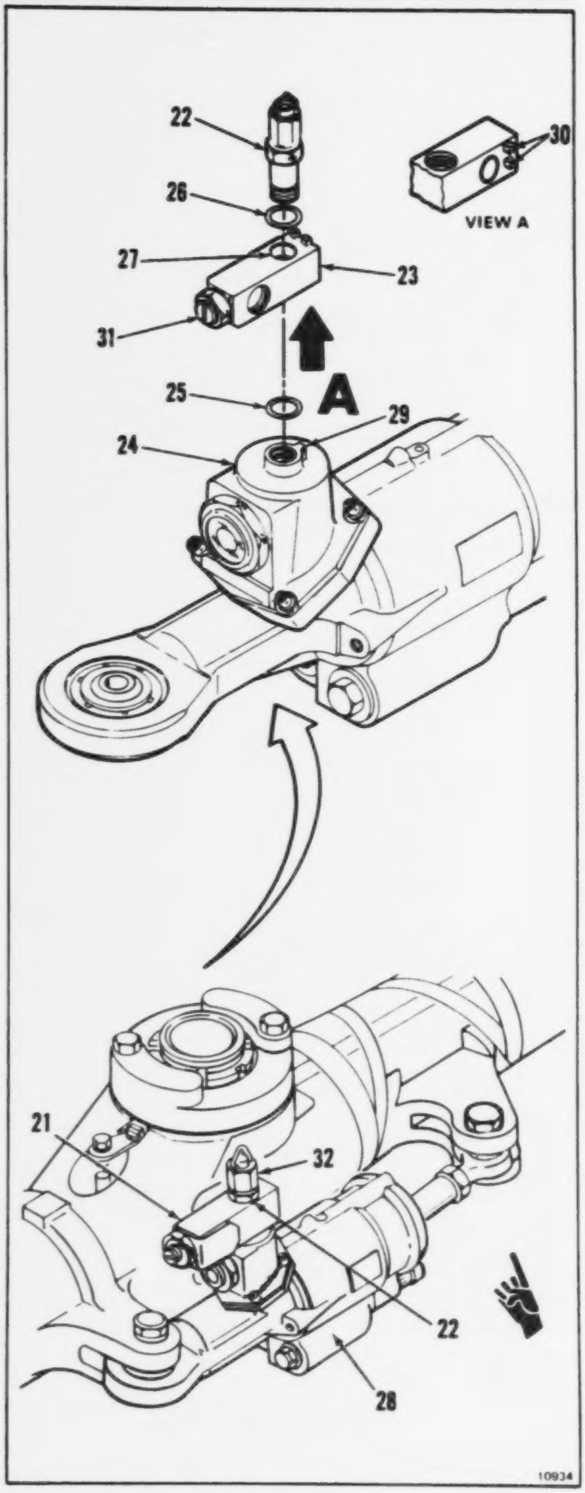
f. Install fitting (22) in body (23). Seat packing.

g. Install packing (25) on fitting (22).

h. Screw fitting (22) and body (23) halfway into tank (24). Let body turn.

i. Position body (23) so index lug (29) on tank (24) is between lugs (30). Screw (31) will face inboard. Hold body. Screw fitting (22) all the way into tank.

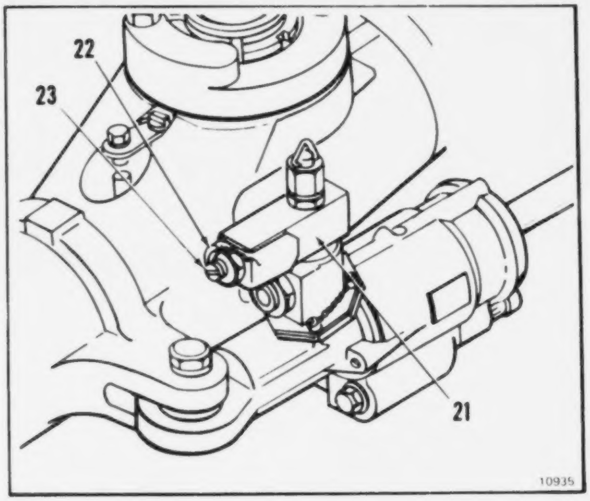
j. Lockwire cap (32) and fitting (22) to lugs (33). Use lockwire (E231).



WARNING

Vent valve must be open for operation below 0°F (−18°C). Valve must be closed for operation above 30°F (−1°C). Dangerous ground and flight conditions can result if valve is in wrong position. At 0°F (−18°C) to 30°F (−1°C) valve may be open or closed.

12. **If operational temperatures are 0°F (−18°C) or lower, open vent valve (21)** as follows:
    a. Remove lockwire. Loosen nut (22) on adjustment screw (23).
    b. Turn screw (23) clockwise to close valve (21) completely. Turn screw counterclockwise 1/2-turn to open valve.
    c. Torque nut (22) to 25 inch-pounds. Lockwire nut to screw (23). Use lockwire (E231).



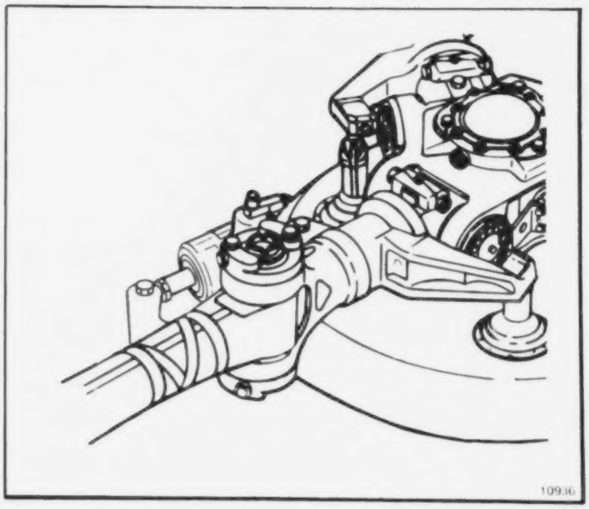
13. If operational temperatures are 30°F (−1°C) or higher, close vent valve (21) as follows:
    a. Repeat step 12a.
    b. Turn screw (23) clockwise to close valve completely.
    c. Repeat step 12c.

FOLLOW-ON MAINTENANCE:

Remove sling from blade.

Remove tiedown lines from blade over fuselage (Task 1-26).

Close work platforms (Task 2-2).



END OF TASK

SECTION V

MAIN ROTOR CONTROLS

5-94 ADJUST PITCH LINK 5-94

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Torque Wrench, 700 to 1600 Inch-Pounds
Crow-Foot Wrench

Materials:
Lockwire (E231)

Parts:
Cotter Pin

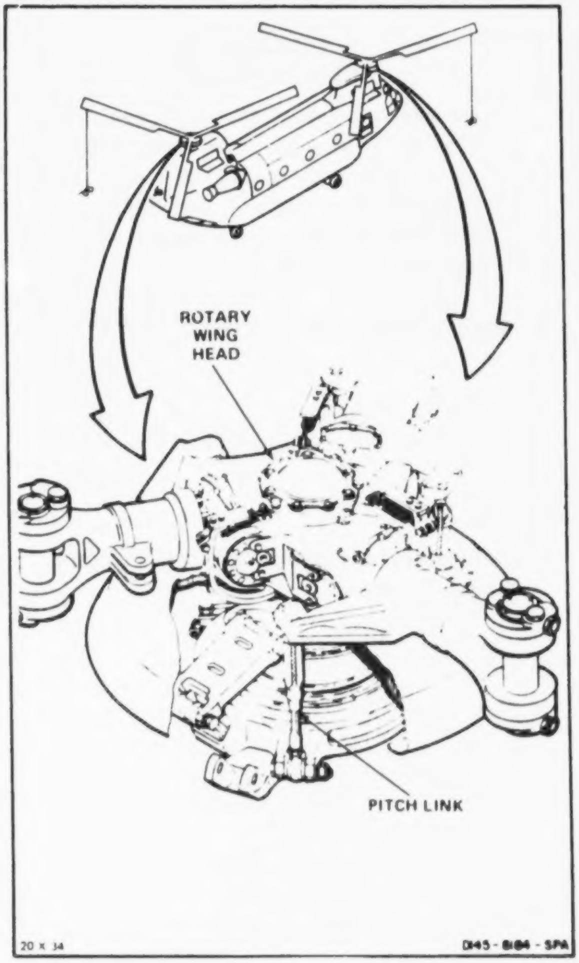
Personnel Required:
67U10 Medium Helicopter Repairer (4)
67U20 Medium Helicopter Repairer
67U30 Inspector

Equipment Condition:
Electrical Power On
Hydraulic Power On
Battery Connected (Task 1-39)
AFCS System Select Switch Off
Tiedown Lines Installed on One Forward and One Aft Blade (Task 1-26)
Work Platforms Open as Required (Task 2-2)

General Safety Instructions:

WARNING

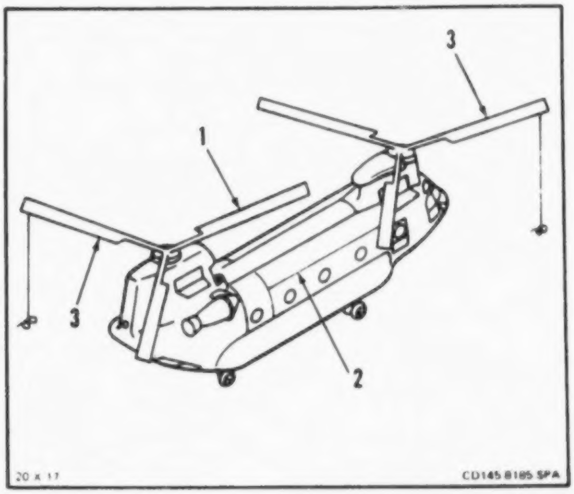
Do not move controls when adjusting pitch links, Serious injury to personnel can result.



NOTE

Procedure is same to adjust forward or aft pitch links. Aft pitch link is shown in task.

1. **Center blade (1) over tunnel (2).** Tie down one forward and one aft blade (3).



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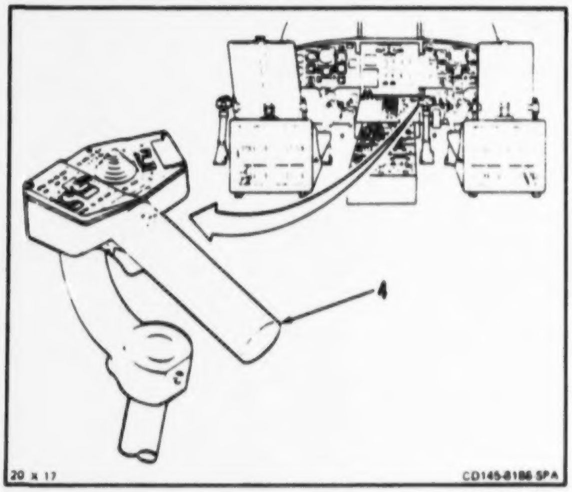
WARNING

Restrain blades when thrust control is raised or lowered to prevent injury to personnel and damage to the aircraft. Aft blade can hit the strobe light when thrust control is full up.

2. **Raise thrust control (4)** all the way up.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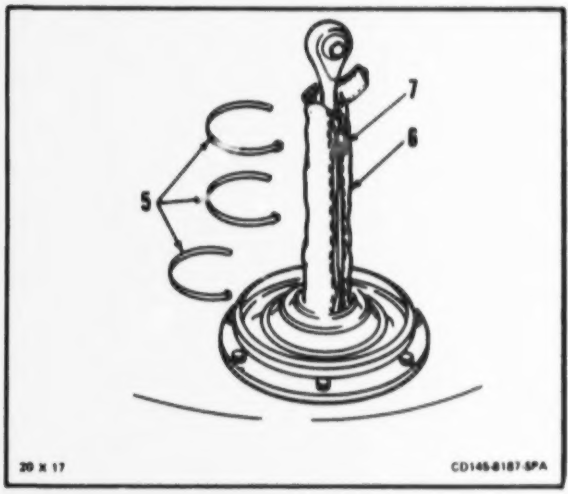
CD145-8186-SPA

3. **Cut ties (5) on pitch link boot (6). Pull zipper (7) down.**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CD145-8187-SPA

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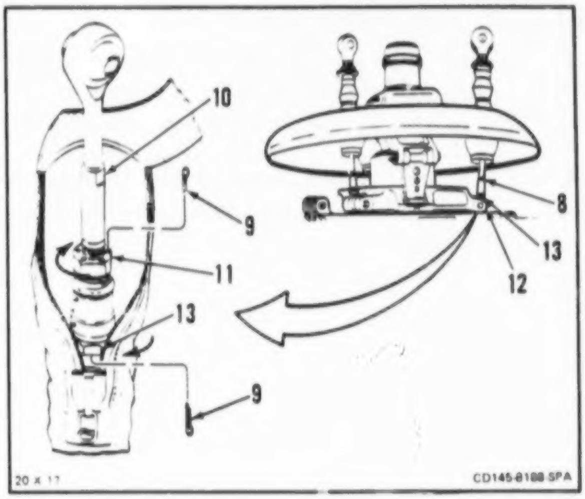
4. **Adjust pitch link (8)** as follows:

   a. Remove lockwire and two cotter pins (9).



CAUTION

Do not hold rod end at opposite end of pitch link when checknut is being loosened. Do not turn upper checknut, or lower checknut counterclockwise to loosen. Damage to pitch link can occur if opposite rod end is held, or nut is overtorqued.

   b. Hold rod end (10) and turn upper checknut (11) clockwise to loosen.

   c. Hold rod end (12) and turn lower checknut (13) clockwise to loosen.

GO TO NEXT PAGE

5-94 ADJUST PITCH LINK (Continued) 5-94

d. Have helpers raise blade (1).

e. Turn turnbuckle (14) toward (-)symbol to shorten pitch link (8). Turn turnbuckle toward (+) symbol to lengthen pitch link.

f. Check that rod ends (10 and 12) are installed deep enough to close inspection holes (15).

CAUTION

Do not hold rod end farthest from checknut being torqued. Damage to pitch link can occur.

g. Hold rod end (10) and torque checknut (11) counterclockwise. Hold rod end (12) and torque checknut (13) counterclockwise. **Torque checknuts to 1050 to 1300 inch-pounds.**

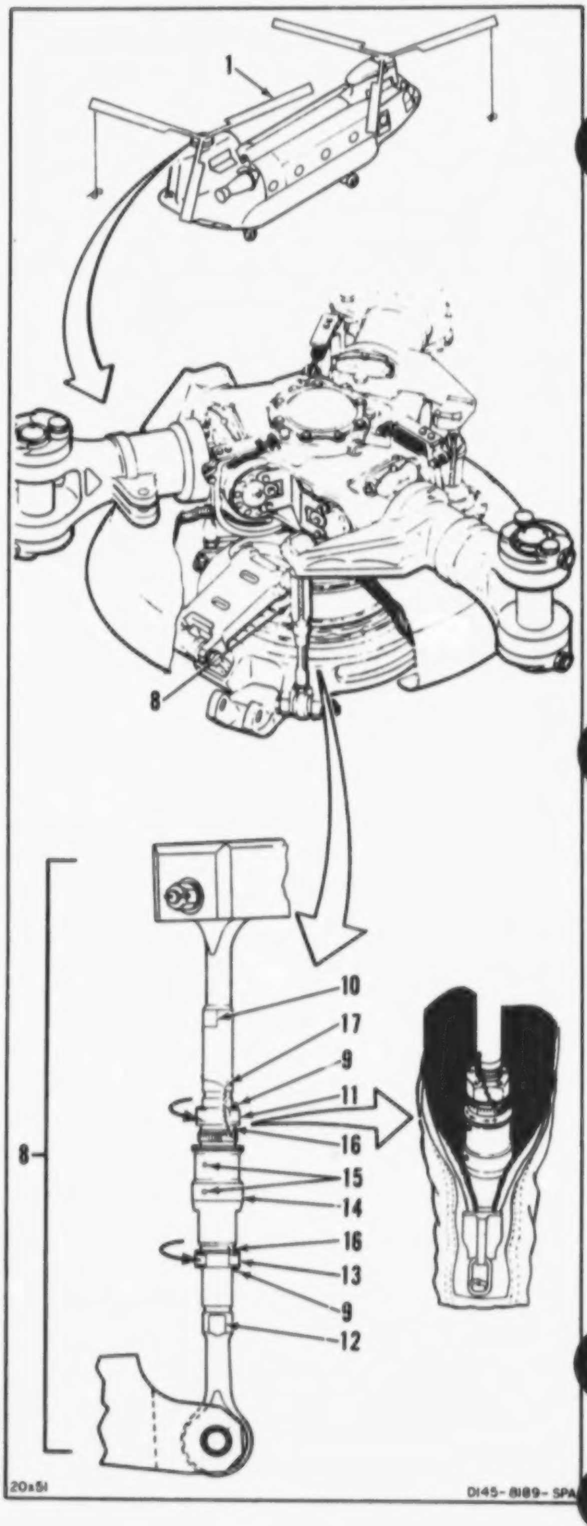
h. Have helpers lower blade (1).

CAUTION

Do not bend cotter pin ends outside of indicator sleeves. Pitch link boot can be damaged.

i. Install two cotter pins (9) through checknuts (11 and 13) and indicator sleeves (16).

j. Install lockwire (E231) from sleeve (16) through hollow pin (17) to prevent movement of turnbuckle (14) in (+) direction. Cut lockwire at pin.



INSPECT

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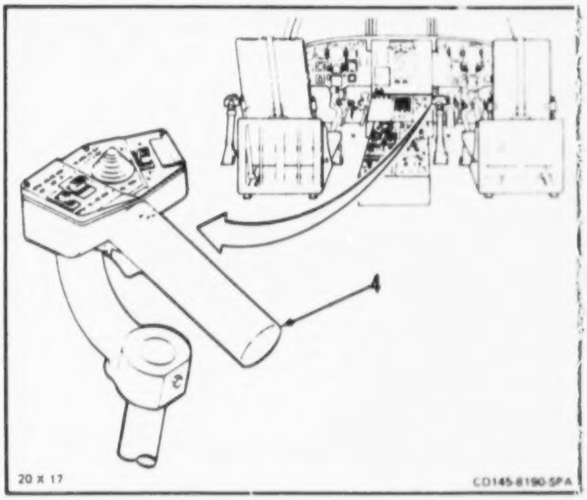
5-94 ADJUST PITCH LINK (Continued) 5-94

5. **Lower thrust control (4).**



FOLLOW-ON MAINTENANCE:

Install pitch link boot (Task 5-135).

Close work platforms (Task 2-2).

Electrical power off.

Hydraulic power off.

Ground track blades (Task 5-140).

Check autorotation % rpm (Task 5-144).

END OF TASK

5-94.1 REPLACE PITCH LINK BOLTS 5-94.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Torque Wrench, 100 to 750 Inch-Pounds

Materials:

Antiseize Compound (E75)

Gloves (E186)

Parts:

Cotter Pins

Bolts

Personnel Required:

Medium Helicopter Repairer (5)

Inspector

References:

TM 55-1520-240-23P

Task 1-14

Equipment Condition:

Electrical Power On

Hydraulic Power On

Battery Connected (Task 1-39)

Afcs System Select Switch Off

Tiedown Lines Installed on One Forward and One Aft Blade (Task 1-26)

Work Platforms Open as Required (Task 2-2)

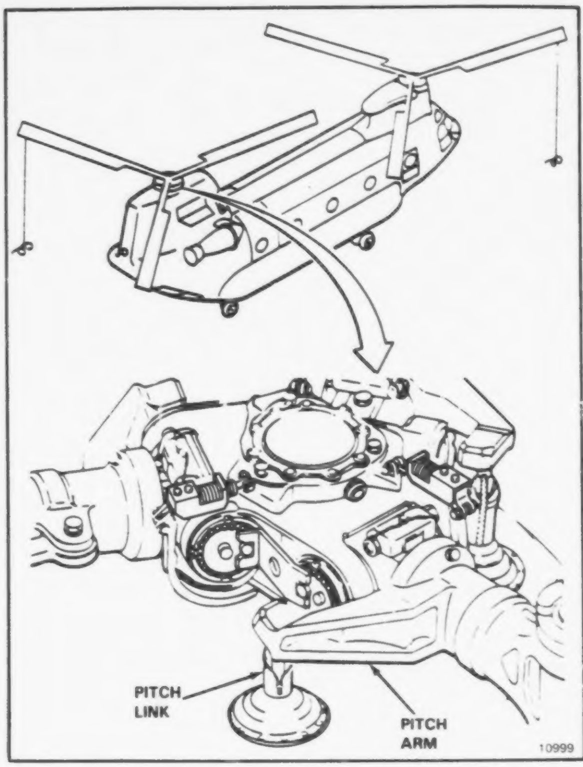
Cockpit Flight Controls in Neutral Position (Task 11-33)

Safety Blocks (T31) Installed at Dual Actuating Cylinders (Task 11-28)

General Safety Instructions:

WARNING

Antiseize compound (E75) can form toxic vapors if exposed to flame. Use in well-ventilated area, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



WARNING

Do not disconnect either end of a pitch link unless the blade load is removed from the pitch link. Injury to personnel and damage to equipment can occur if a pitch link is disconnected without the blade load being supported by other means.

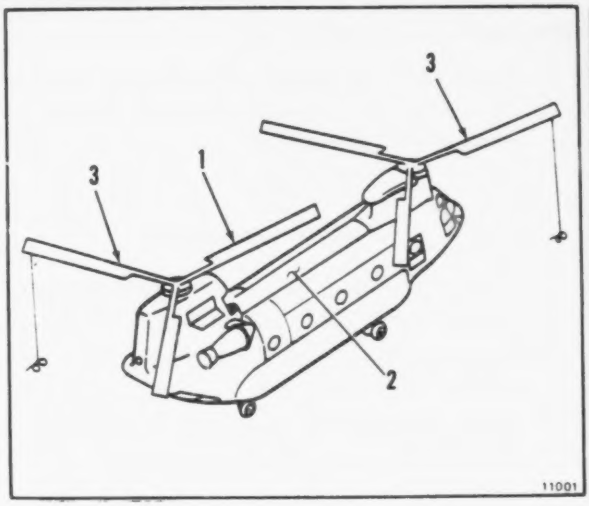
GO TO NEXT PAGE

5-94.1 REPLACE PITCH LINK BOLTS (Continued) 5-94.1

NOTE

- Procedure is same to install forward or aft pitch links. Aft pitch links are shown in task.
- Positive retention bolts are installed in pitch links. They have a pawl which prevents nut or bolt removal unless the pawl is depressed (Task 1-14).

1. **Position blade (1) with bolt to be replaced over tunnel (2).** Tie down one forward and one aft blade (3).



5-94.1 REPLACE PITCH LINK BOLTS (Continued) 5-94.1

REPLACE LOWER BOLT

2. **Remove** cotter pin (4), **nut (5),** and washer (6) from bolt (7) in swashplate (8). Do not remove bolt at this time.

NOTE

Do not lubricate thread.

3. Apply antiseize (E75) to sleeve (9) and shank (10) of new bolt (7). Use gloves (E186)
4. Have helpers lift blade (1) to permit removal of bolt (7). Remove bolt.
5. **Install new bolt (7).** Check that limiter (10.1) and bushing (10.2) remain installed.
6. **Lower blade (1). Install** washer (6) and **nut (5)** on bolt (10). Torque nut to 400 to 660 inch-pounds. Install cotter pin (4).

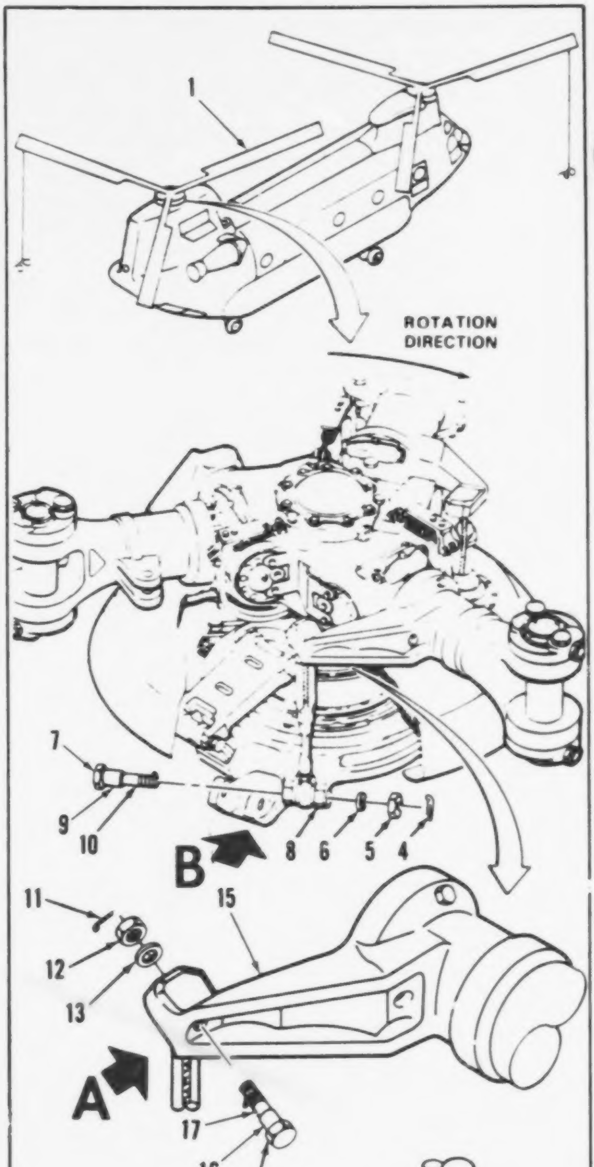
REPLACE UPPER BOLT

7. Remove cotter pin (11), nut (12), and washer (13) from bolt (14) in pitch arm (15). Do not remove bolt at this time.

NOTE

Do not lubricate thread.

8. Apply antiseize compound (E75) to sleeve (16) and shank (17) of new bolt (14). Wear gloves (E186).
9. Have helpers lift blade (1) to permit removal of bolt (14). Remove bolt.
10. **Install new bolt (14).** Check that limiter (18) and bushing (19) remain installed.
11. Lower blade (1). **Install** washer (13) and **nut (12)** on bolt (14). Torque nut to 400 to 660 inch-pounds. Install cotter pin (11).



INSPECT

FOLLOW-ON MAINTENANCE:

Remove safety blocks at servocylinders (Task 11-29).

Remove electrical power.

Remove hydraulic power.

Close work platforms (Task 2-2).

Remove tiedown lines from blades (Task 1-26).

END OF TASK

5-95 PREPARE PITCH LINK FOR STORAGE OR SHIPMENT 5-95

INITIAL SETUP

Applicable Configurations:

All

Tools:

None

Materials:

Dry Cleaning Solvent (E162)
Cloth (E120)
Barrier Material (E80)
Waterproof Tape (E395)
Gloves (E186)

Personnel Required:

Medium Helicopter Repairer

Equipment Condition:

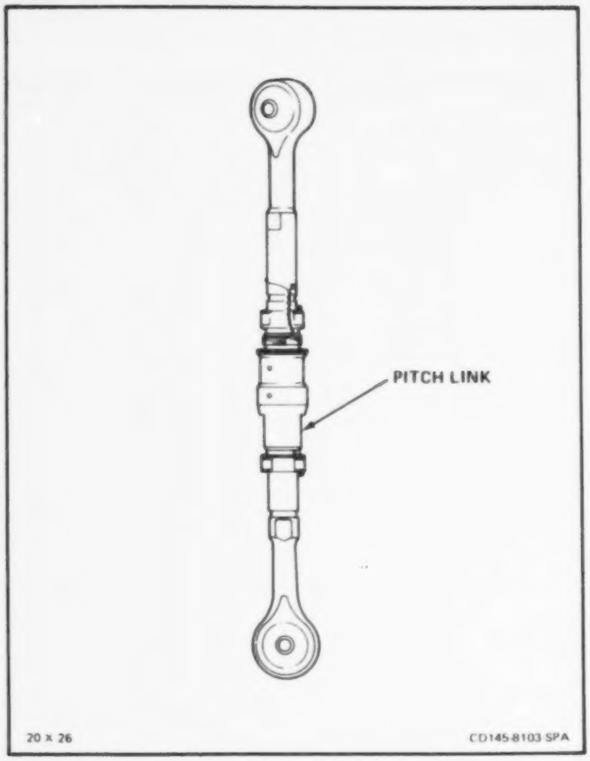
Off Helicopter Task

WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Get medical attention for eyes.

CAUTION

Do not apply excess solvent (E162) to pitch link. Contaminants can wash into dry-type bearings.



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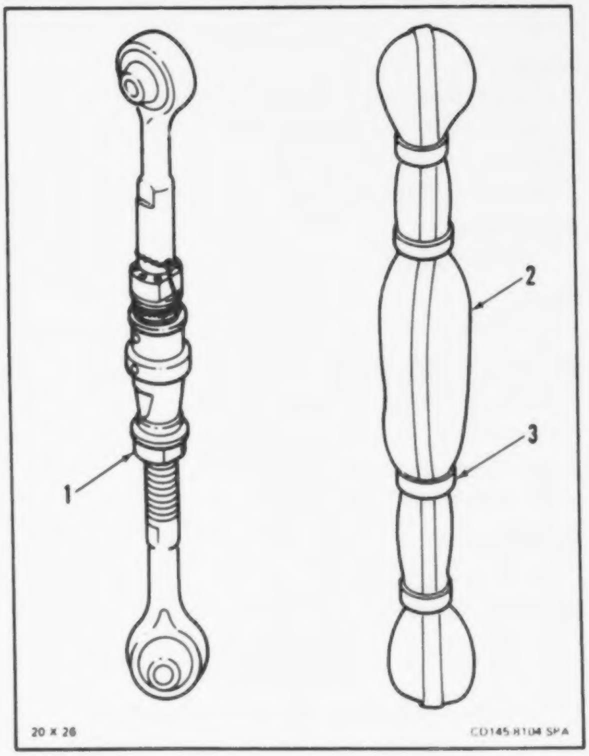
5-95 PREPARE PITCH LINK FOR STORAGE OR SHIPMENT (Continued) 5-95



NOTE

Procedure is same to prepare any pitch link for storage or shipment.

1. **Clean pitch link (1).** Use cloth (E120) damp with solvent (E162). Wear gloves (E186).

2. **Wrap pitch link (1)** tightly in barrier material (E80) (2). Seal with waterproof tape (E395) (3).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-96 PREPARE PITCH LINK FOR SERVICE 5-96

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Vernier Caliper, 24-inch

Assembly Fixture (T18)

Materials:

Lockwire (E231)

Parts:

Cotter Pins

Personnel Required:

Medium Helicopter Repairer

Inspector

Equipment Condition:

Off Helicopter Task

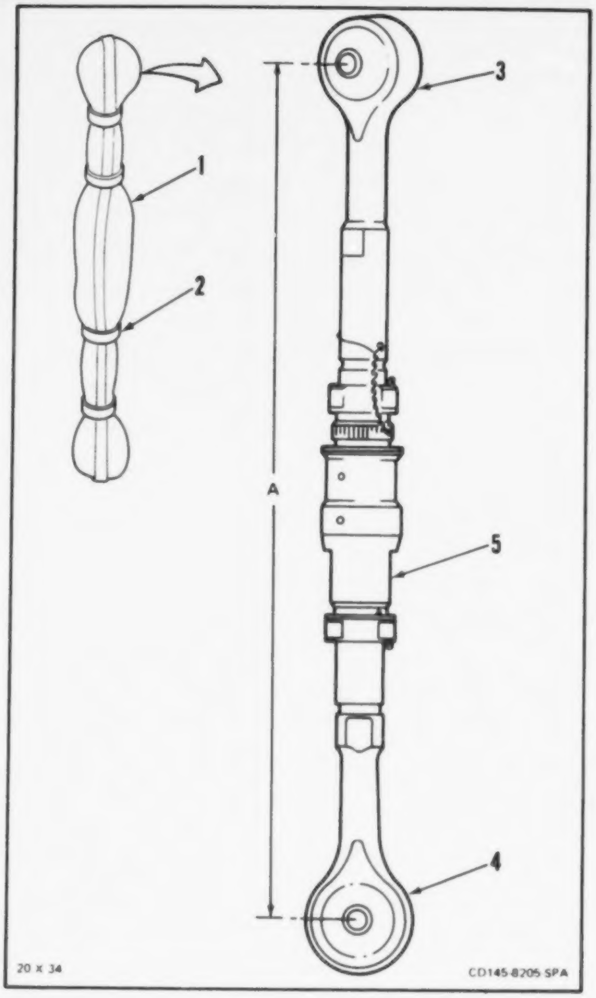
References:

TM 55-1520-240-23P

General Safety Instructions:

WARNING

Do not stake either rod end. Do not place bearing in service with staked rod end. Staking can cause pitch link failure resulting in damage to helicopter and injury to personnel.



1. Remove barrier material (1) and tape (2).
2. **Measure distance A** between centers of holes in rod ends (3 and 4) on pitch link (5) to be replaced.

NOTE

If pitch link to be replaced is damaged and original length is changed, replacement link should be adjusted to 18.750 inches (aft) or 18.250 inches (forward) between rod end centers.

GO TO NEXT PAGE

5-96 PREPARE PITCH LINK FOR SERVICE (Continued) 5-96

3 **Adjust replacement link (5)** so distance between centers of rod ends (3 and 4) is same as Distance A. Adjust as follows:

a. Remove lockwire and two cotter pins (6) from checknuts (7 and 8).

CAUTION

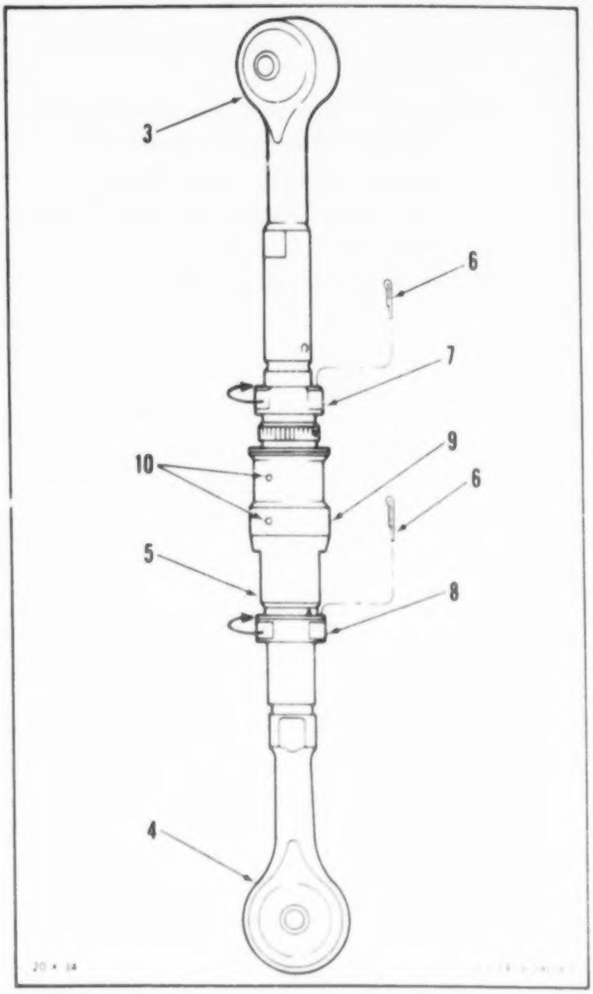
Do not hold rod end at opposite end of pitch link when checknut is being loosened. Do not turn upper checknut, or lower checknut clockwise to loosen. Damage to pitch link can occur if opposite rod end is held, or nut is overtorqued.

b. Hold rod end (3) and turn upper checknut (7) clockwise to loosen.

c. Hold rod end (4) and turn lower checknut (8) counterclockwise to loosen.

d. Turn turnbuckle (9) clockwise toward - symbol to shorten pitch link (5). Turn turnbuckle counterclockwise toward + symbol to lengthen pitch link.

e. Check that rod ends (3 and 4) are installed deep enough to close inspection holes (10). Do not torque checknuts (7 and 8) at this time.



INSPECT

GO TO NEXT PAGE

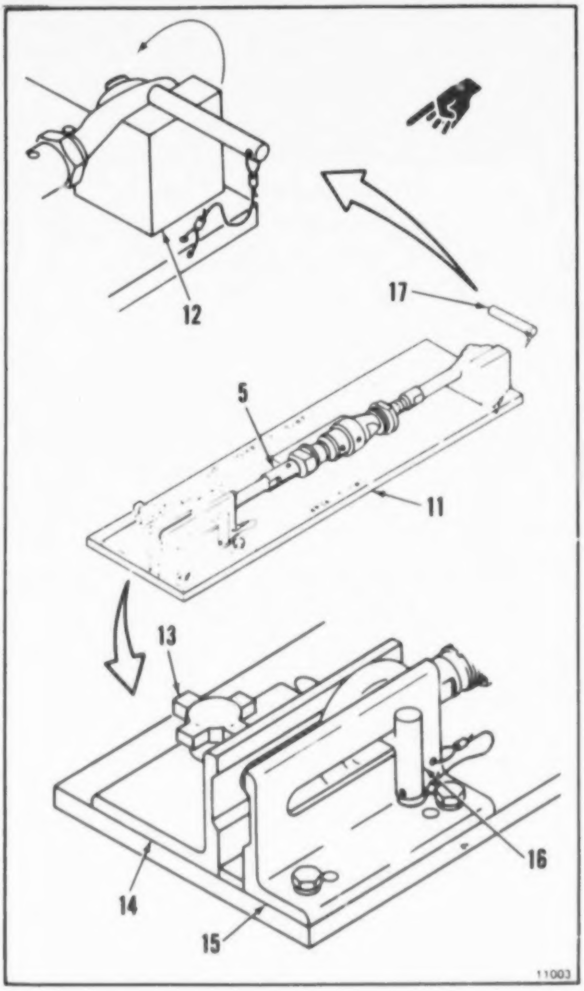
4. **Position pitch link (5) on assembly fixture (T78) (11)** as follows:

   a. Position block (12) for forward or aft link (5).

   b. Loosen hand knob (13). Move sliding angle (14) clear of fixed angle (15).

   c. Position pitch link (5) on fixture (11). Close sliding angle (14). Tighten hand knob (13).

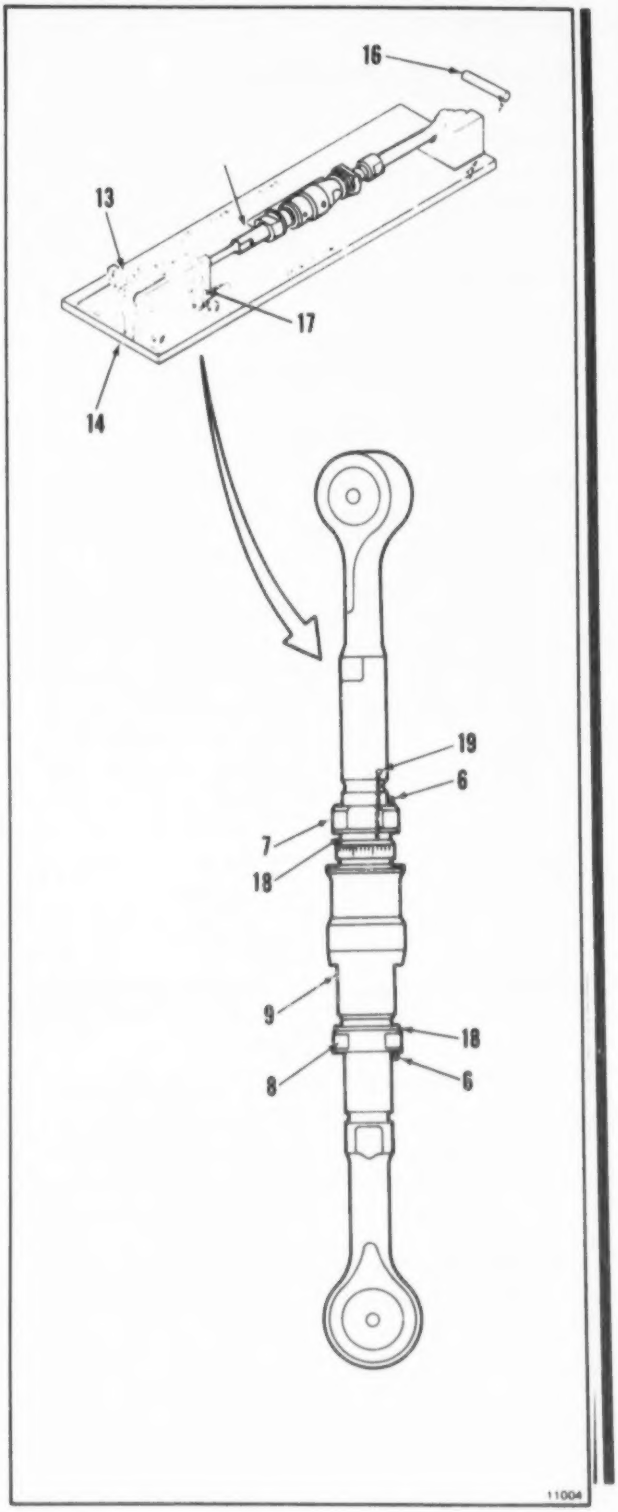
   d. Install locating pins (16 and 17).



CAUTION

Do not hold rod-end at opposite end of pitch link when checknut is tightened. Do not turn upper checknut clockwise or lower checknut counterclockwise to tighten. Damage to pitch link can occur.

5. **Torque upper and lower checknut (7 and 8) to 1050 to 1300 inch-pounds.**
6. Install cotter pins (6). Keep split ends within outside of indicator sleeves (18) to avoid boot damage.
7. Lockwire turnbuckle (9) to hole in pin (19). Use lockwire (E231).
8. **Remove pitch link (5) from assembly fixture (T78) (11)** as follows:
   a. Remove pins (16 and 17).
   b. Loosen hand knob (13). Move sliding angle (14) clear.
   c. Remove pitch link (5).



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-96.1 INSTALL PITCH LINK LOCKPINS — POWER OFF 5-96.1

INITIAL SETUP

Applicable Configurations:
All

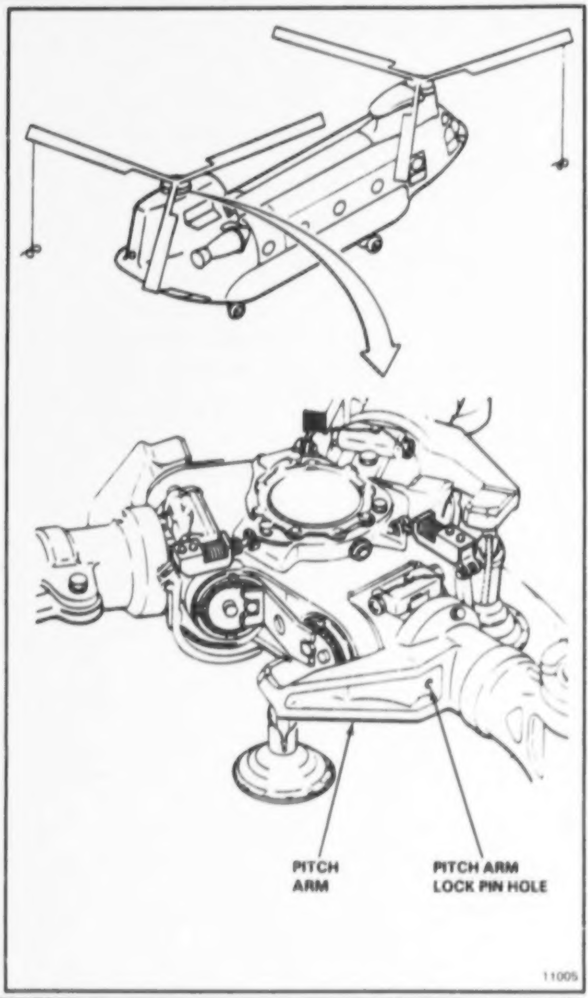
Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Lockpin (T22)

Materials:
None

Personnel Required:
Medium Helicopter Repairer (5)

References:
Task 5-97

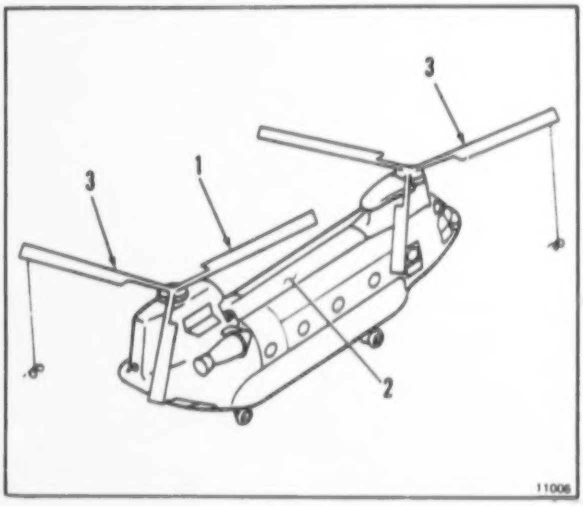
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line on One Forward and One Aft Blade (Task 1-26)
Forward or Aft Work Platform Open (Task 2-2)
Pitch Links Disconnected (Task 5-97)



NOTE

Procedure is same to install pitch lock pins in any pitch arm on either forward or aft rotary wing head. Installation of pitch lock pin on pitch arm of aft rotary wing head is shown.

1. **Position blade to be locked (1) over tunnel (2).** Tie down one forward and one aft blade (3).



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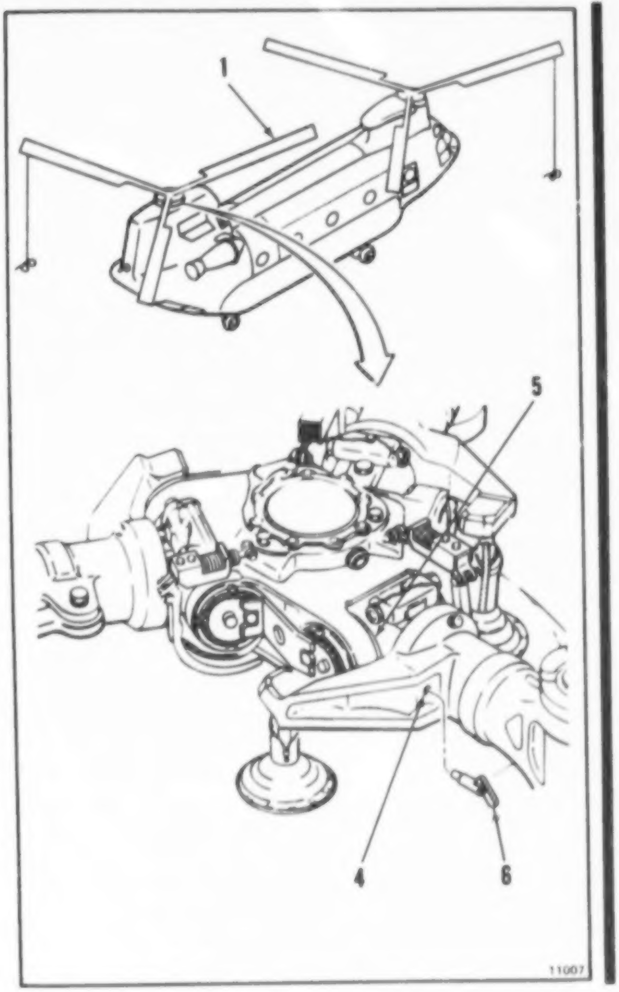
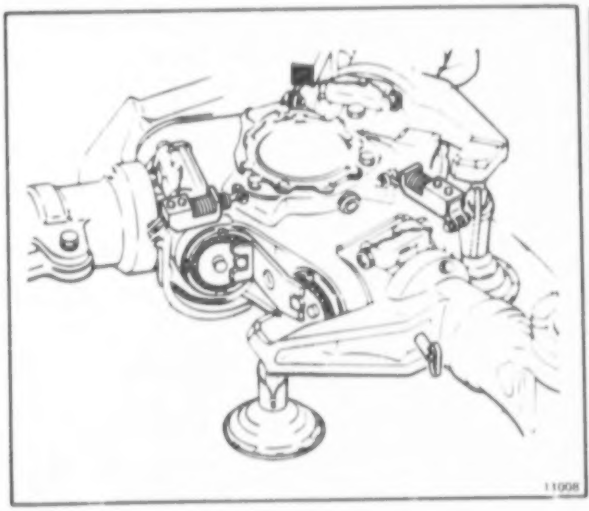
5-96.1 INSTALL PITCH LINK LOCKPINS — POWER OFF (Continued) 5-96.1

2. **Have helpers lift and twist blade (1)** as required to align holes in pitch arm (4) and pitch shaft (5).
3. **Install pitch link lockpin (6).**
4. **Carefully lower blade (1).**

CAUTION

Do not let the pitch lockpin stay in the pitch arm with the pitch link installed. If the rotary-wing head is turned or the apu started when both a pitch lockpin and pitch link are installed at the same pitch arm, damage to components will occur.

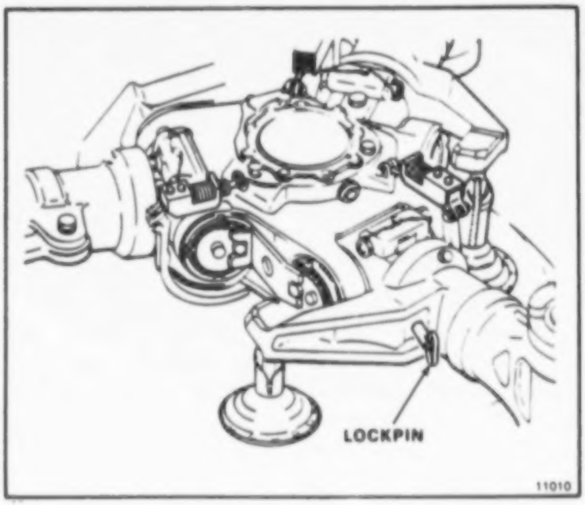




FOLLOW-ON MAINTENANCE:
None

END OF TASK

5-96.2 REMOVE PITCH LINK LOCKPIN — POWER OFF 5-96.2



INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Lockpin (T22)

Materials:
None

Personnel Required:
Medium Helicopter Repairer (5)

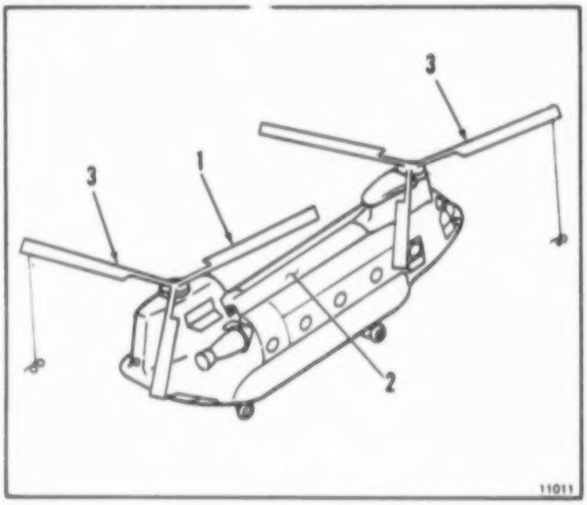
References:
Task 5-99

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Tiedown Line on One Forward and One Aft Blade (Task 1-26)
Forward or Aft Work Platform Open (Task 2-2)

NOTE

Procedure is same to remove pitch link lockpins in any pitch arm on either forward or aft rotary wing head. Removal of pitch lockpins on pitch arm of aft rotary wing head is shown.

1. **Position locked blade (1) over tunnel (2).** Tie down one forward and one aft blade (3).



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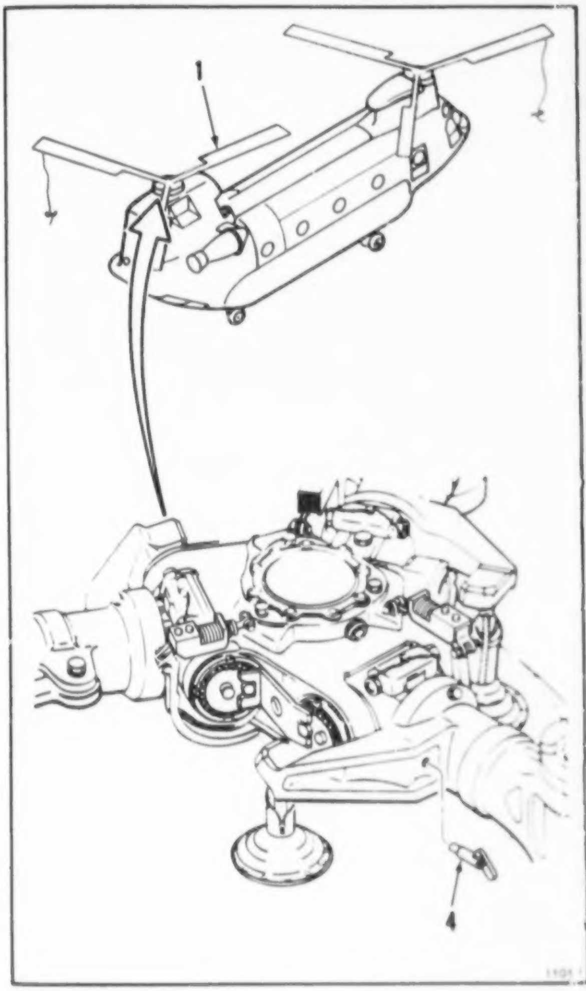
5-96.2 REMOVE PITCH LINK LOCKPIN — POWER OFF (Continued) 5-96.2

2. **Have helpers lift and twist blade (1)** as required to remove pitch link lockpin (4).
3. **Remove pitch link lockpin (4).**
4. **Carefully lower blade (1).**



FOLLOW-ON MAINTENANCE:

Connect pitch links (Task 5-99).

END OF TASK

5-97 REMOVE PITCH LINK

INITIAL SETUP

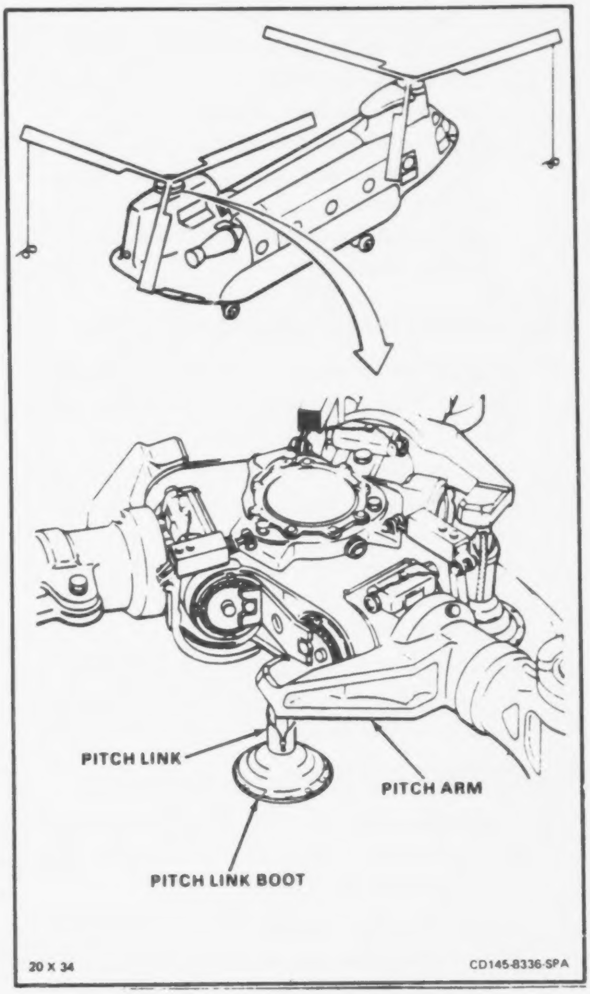
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Lockpin (T22)

Materials:
None

Personnel Required:
67U10 Medium Helicopter Repairer (4)
67U20 Medium Helicopter Repairer

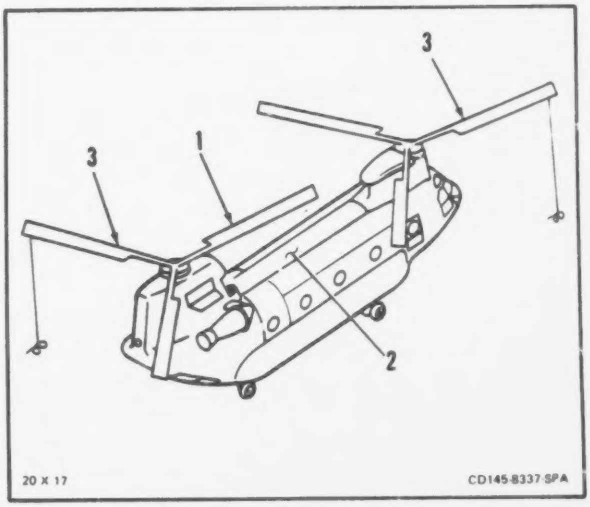
Equipment Condition:
Electrical Power On
Hydraulic Power On
Battery Connected (Task 1-39)
AFCS System Select Switch Off
Tiedown Lines Installed on One Forward and One Aft Blade (Task 1-26)
Work Platforms Open as Required (Task 2-2)
Cockpit Flight Controls in Neutral Position (Task 11-33)
Safety Blocks (T31) Installed at Dual Actuating Cylinders (Task 11-28)
Pitch Link Boot Open as Required (Task 5-134)



NOTE

- Procedure is same to remove forward or aft pitch links. Aft pitch links are shown in task.
- Positive retention bolts are installed in pitch links. They have a pawl which prevents nut or bolt removal unless the pawl is depressed (Task 1-14).

1. **Position blade (1) over tunnel (2).** Tie down one forward and one aft blade (3).



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5-97 REMOVE PITCH LINK (Continued) 5-97

WARNING

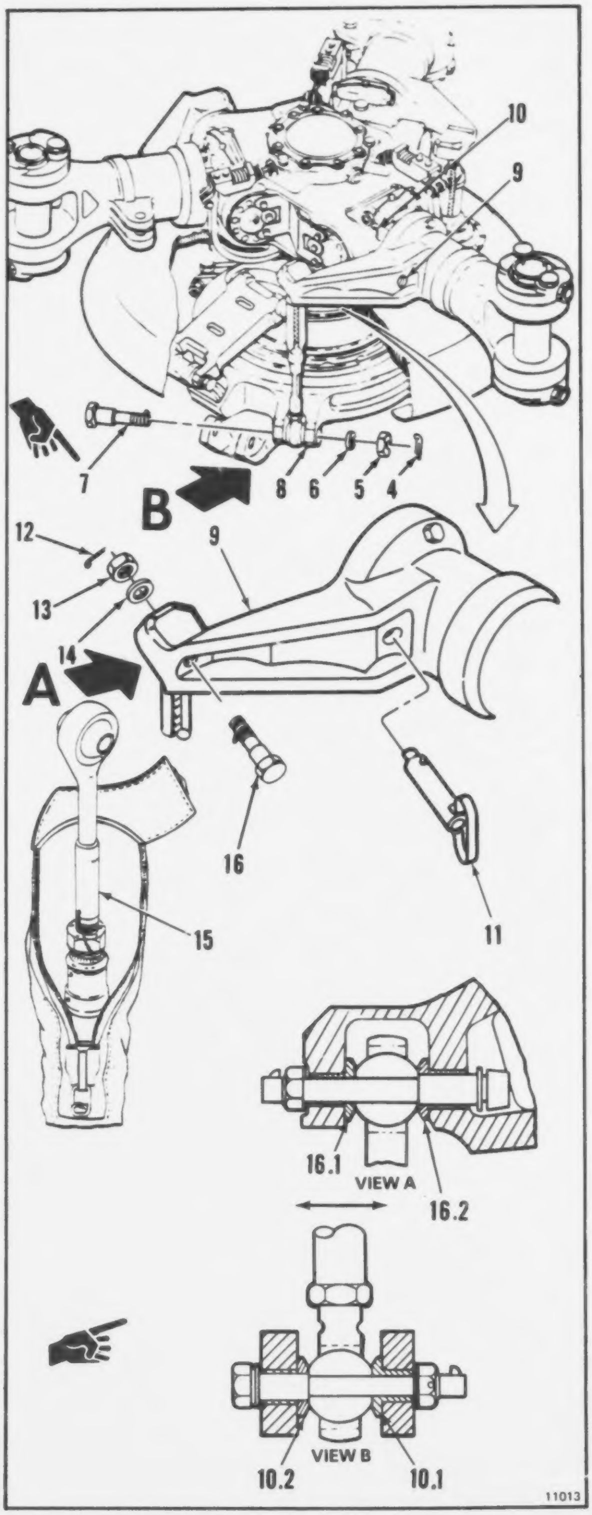
Do not disconnect either end of a pitch link unless the blade load is removed from the pitch link. Injury to personnel and damage to equipment can occur if a pitch link is disconnected without the blade load being supported by other means.

DISCONNECT PITCH LINK LOWER END

2. Remove cotter pin (4), nut (5), and washer (6) from bolt (7) in swashplate (8). Do not remove bolt.
3. Position blade (1) at center of lead-lag travel. **Have helpers lift blade to permit removal of bolt (7).** Support and twist blade as required to align holes in pitch arm (9) and pitch shaft (10). **Install lockpin (11).** Remove bolt. Lower blade.
4. Install bolt (7), washer (6), and nut (5) in swashplate (8) temporarily. Make sure bushing (10.1) and limiter (10.2) remain installed.

DISCONNECT PITCH LINK UPPER END

5. **Remove** cotter pin (12), nut (13), washer (14), and **bolt (16)** from pitch arm (9). **Remove pitch link (15).**
6. Install bolt (16), washer (14), and nut (13) in pitch arm (9) temporarily. Make sure bushing (16.1) and limiter (16.2) remain installed.



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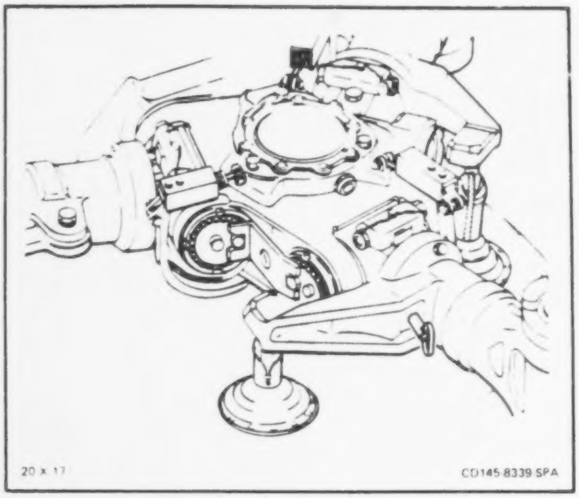
5-97 REMOVE PITCH LINK (Continued) 5-97

FOLLOW-ON MAINTENANCE:

None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END OF TASK

5-97.1 INSPECT PITCH LINK BEARINGS ON HELICOPTER 5-97.1

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

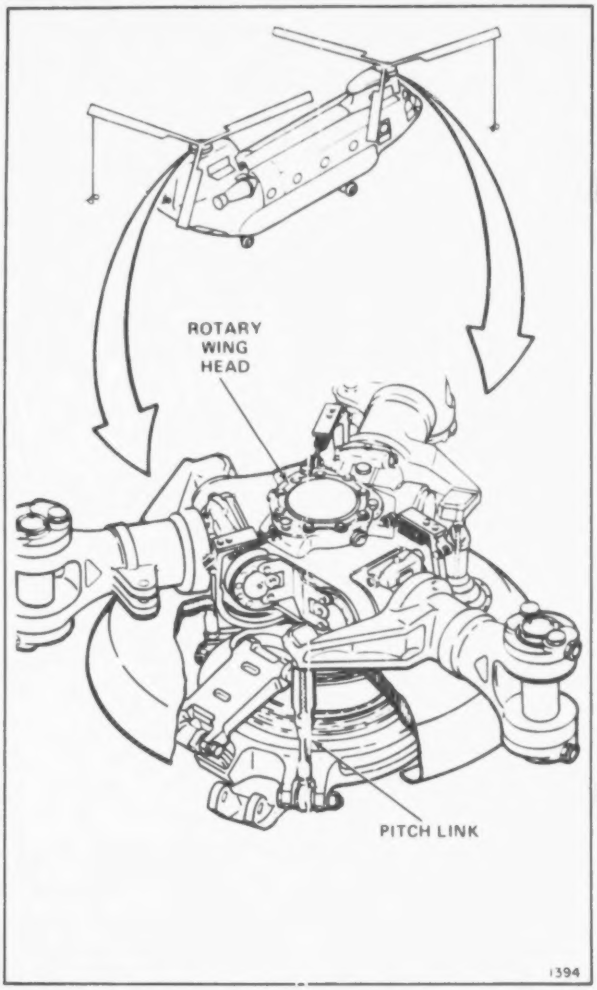
Materials:
None

Parts:
Tie

Personnel Required:
Medium Helicopter Repairer (4)
Inspector

References:
Task 5-97
Task 5-98

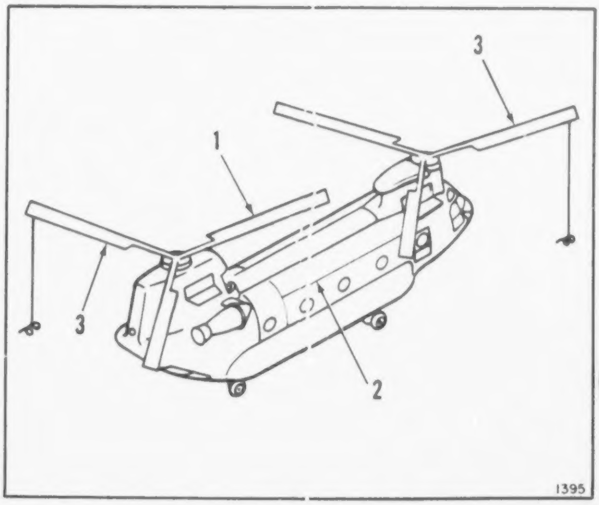
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Forward or Aft Work Platform Open (Task 2-2)
Tiedown Line Installed on One Forward and One Aft Blade (Task 1-26)



NOTE

- Procedure is same to inspect forward or aft pitch links. Aft pitch link is shown in task.
- Task will determine total lost motion of bearing, bolt, and bushings. If check shows excessive lost motion, bolt and bushings must be replaced and pitch link must be removed and checked (Task 5-98).

1. **Position blade (1) over fuselage (2)** centered in its lead/lag range. Tie down one forward and one aft blade (3).



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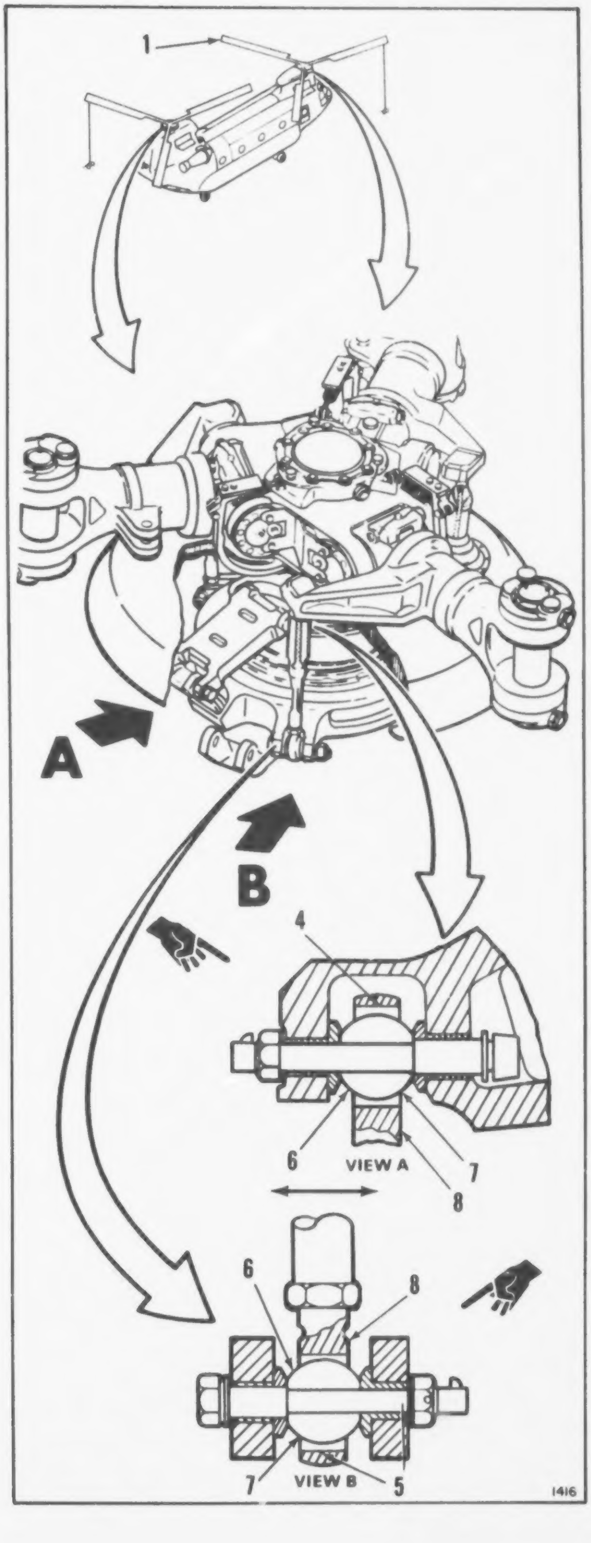
5-97.1 INSPECT PITCH LINK BEARINGS ON HELICOPTER (Continued) 5-97.1

2. **Check for bond looseness in upper bearing (4) and lower bearing (5)** as follows:

   a. Check that teflon liner (7) has not been squeezed out around bearing ball (6). If some cloth threads show, this is not always a sign of bond failure. If strings of fabric are coming out from around bearings (4 and 5), or if liner shows 1/32-inch or more, replace bearing (4 or 5) (Task 5-98) and go to FOLLOW-ON MAINTENANCE. If less than 1/32-inch of liner shows, go to step b.

   b. Have helpers support blade (1). Check pitch link rod end (8). If rod end is not centered on bearing ball (6), replace bearing (4 or 5) (Task 5-98). Shake rod end from side-to-side. Movement shows that the teflon liner (7) is worn or missing. Have helpers lower blade (1). Replace bearing (4 or 5) (Task 5-98). If rod end is centered and will not shake from side-to-side, go to FOLLOW-ON MAINTENANCE.



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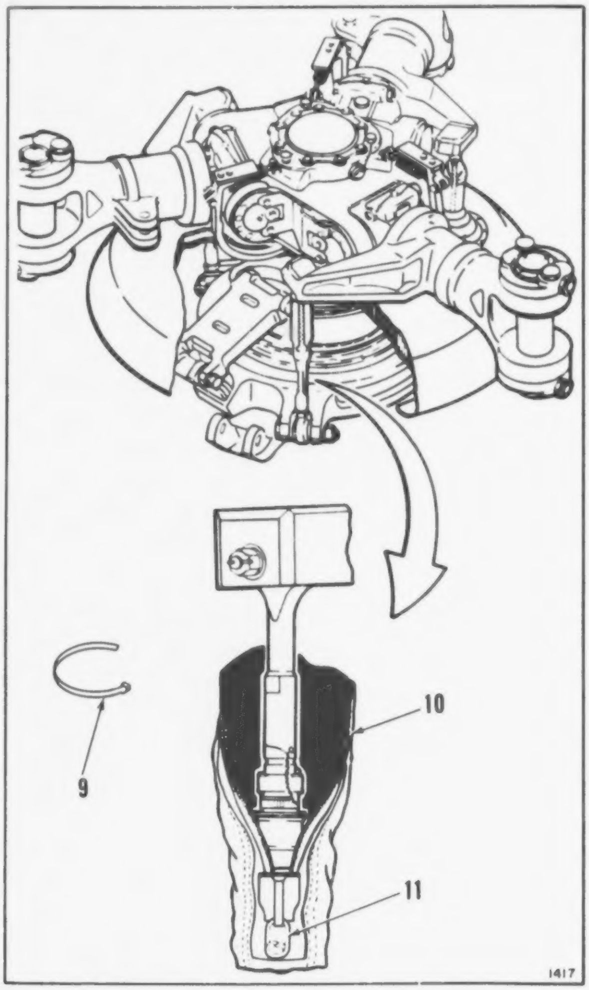
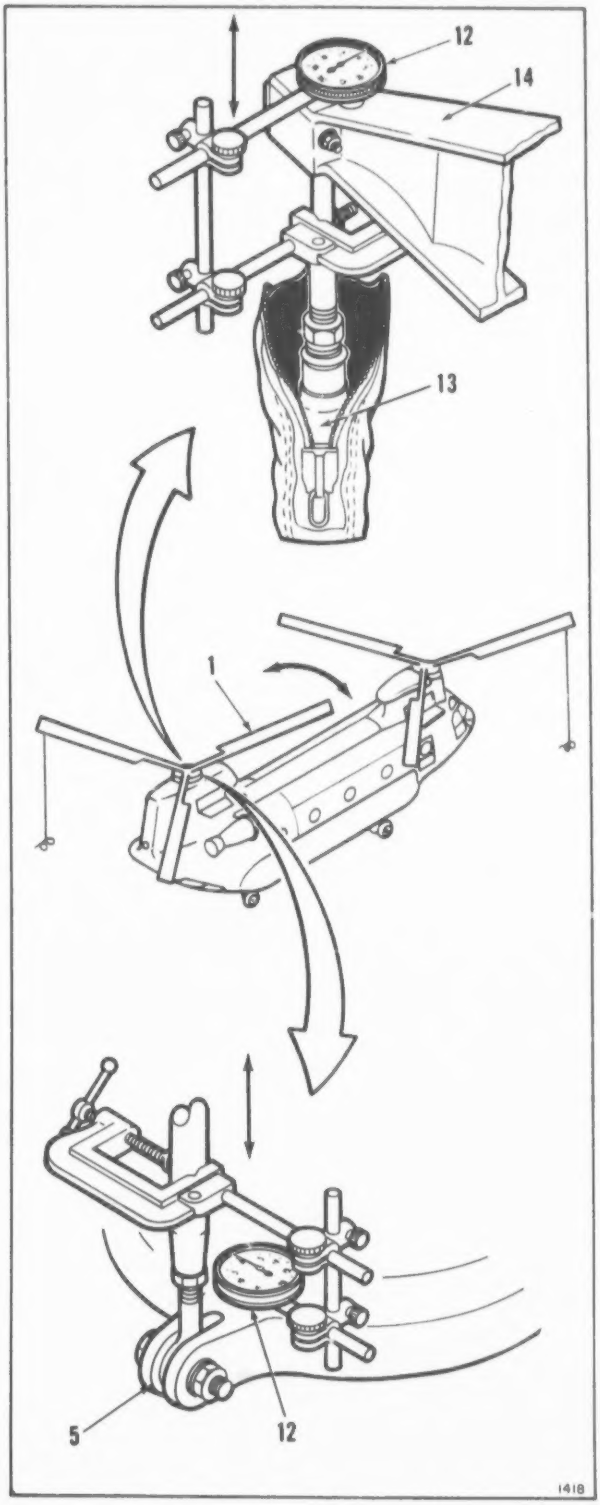
5-97.1 INSPECT PITCH LINK BEARINGS ON HELICOPTER (Continued) 5-97.1

3. Cut tie (9) on pitch link boot (10). **Pull zipper (11) down.**



5-97.1 INSPECT PITCH LINK BEARINGS ON HELICOPTER (Continued) 5-97.1

4. To **check upper bearing wear, clamp dial indicator (12)** at upper end of pitch link (13) as shown.
5. Have helpers support and twist rotary wing blade (1) to **raise pitch arm (14). Note dial indication.** Have helpers twist blade to **lower pitch arm. Note dial indication.** Difference is total looseness.
6. **Repeat step 5 two more times.** Add total of three indications. Divide by 3.
7. **Repeat steps 4, 5, and 6 for lower bearing (5).** Remove dial indicator (12).
8. **If dial indicator average in step 6 or step 7 is more than 0.010 inch, go to step 9. If dial indicator (12)** shows **0.010 inch or less, go to FOLLOW-ON MAINTENANCE.**



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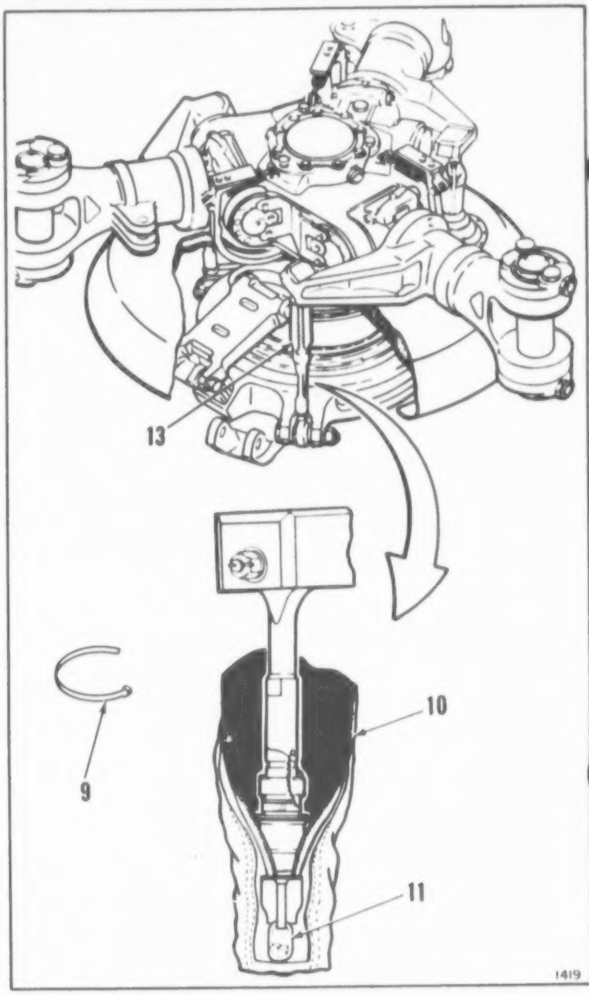
5-97.1 INSPECT PITCH LINK BEARINGS ON HELICOPTER (Continued) 5-97.1

9. If dial indicator average in step 8 is more than 0.010 inch, remove pitch link (13) (Task 5-97) and **check bearing clearance (Task 5-98).**
10. Pull zipper (11) up. Install tie (9) on pitch link boot (10).



FOLLOW-ON MAINTENANCE:

Close forward or aft work platform (Task 2-2).

END OF TASK

5-98 REPAIR PITCH LINK 5-98

INITIAL SETUP

Applicable Configurations:
All

Tools:
- Technical Inspection Tool Kit, NSN 5180-00-323-5114
- Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
- Bench Vise
- Arbor Press
- Assembly Fixture (T78)
- Swaging Tool (T105)
- Pneumatic Drill
- Twist Drill Set
- Torque Wrench, 700 to 1600 Inch-Pounds
- Metal Flaw Detector Kit
- Drift, 1/8-Inch Diameter
- Dial Indicating Scale, 0 to 50 Pounds

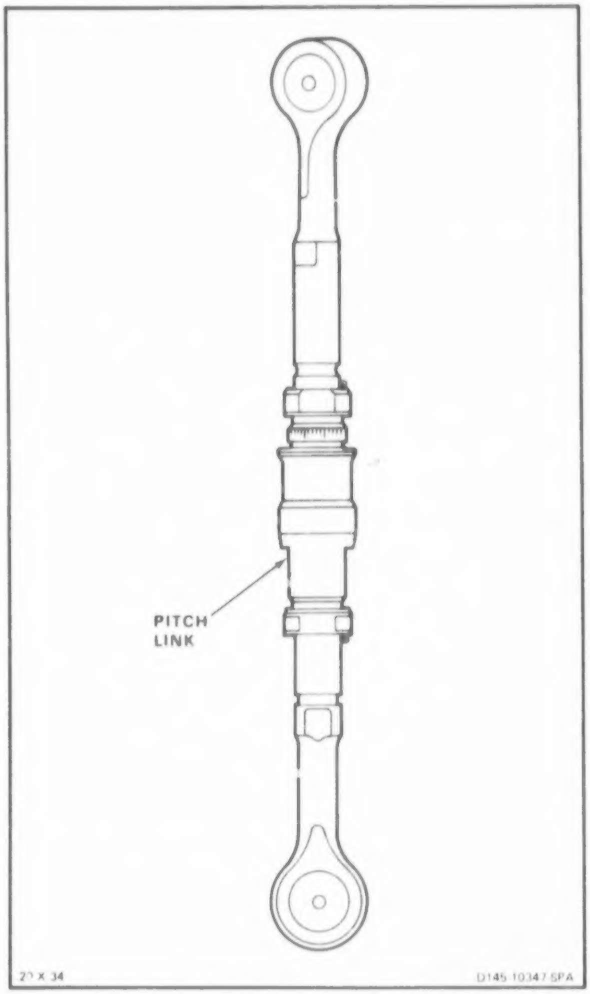
Materials:
- Cloth (E120)
- Dry Cleaning Solvent (E162)
- Antiseize Compound (E75)
- Lockwire (E231)
- Gloves (E186)

Parts:
- Cotter Pins

Personnel Required:
- Medium Helicopter Repairer (2)
- Inspector

References:
- TM 55-1500-322-24
- TM 55-1520-240-23P

Equipment Condition:
Off Helicopter Task

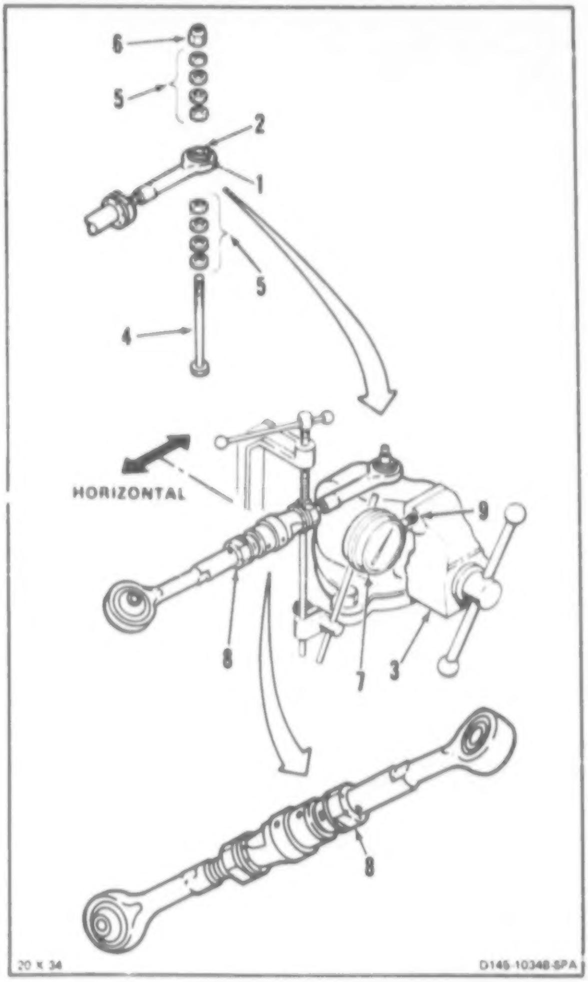


NOTE

Procedure is same to repair any pitch link.

GO TO NEXT PAGE

1. **Check the pitch link bearings (1)** as follows:
   - a. Clamp inner race (2) in bench vise (3). Use bolt (4), washers (5), and nut (6).
   - b. Attach dial indicator (7) to pitch link (8).
   - c. Place contact point (9) against vise (3).
   - d. Have helper apply load of 50 pounds in horizontal direction. Use dial indicating scale. Set dial indicator (7) to 0.
   - e. Apply load in opposite direction. Read bearing clearance on indicator (7).
   - f. Remove pitch link (8) from vise (3).
2. If bearing clearance is less than 0.010-inch, go to step 5.



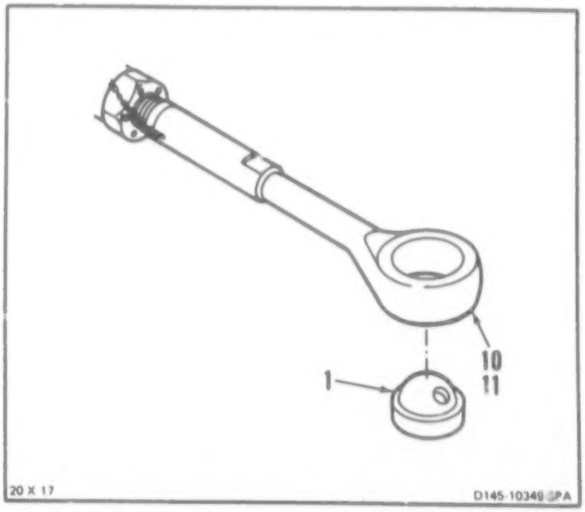
REPLACE BEARING

3. If bearing clearance is greater than 0.010-inch, remove and check bearing (1) as follows:
   - a. Press bearing (1) out of rod-end (10 or 11). Use arbor press and adapter (TM 55-1500-322-24).

WARNING

Dry cleaning solvent (E162) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

   - b. Wipe rod-end clean. Use cloth (E120) damp with solvent. Wear gloves (E186).
   - c. Check rod-end (10 or 11) for cracks or other defects. Use metal flow detector kit to confirm presence of cracks (MIL-I-6866). There shall be no cracks or staking marks.



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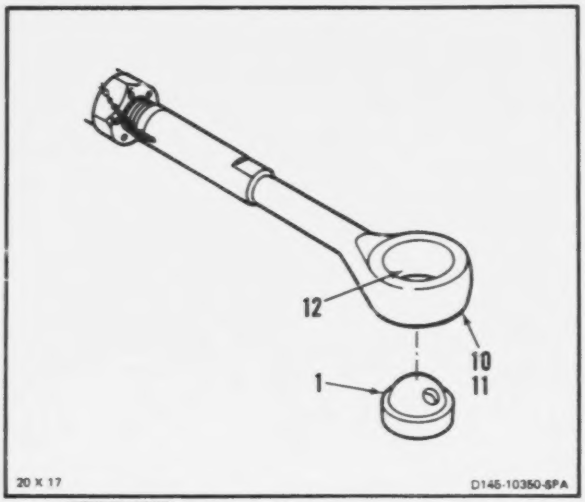
5-98 REPAIR PITCH LINK (Continued) 5-98

d. Check bearing (1). Outside diameter shall be 1.7495 to 1.7500-inches. Check rod-end bore (12). Diameter shall be 1.7482 to 1.7487-inches.



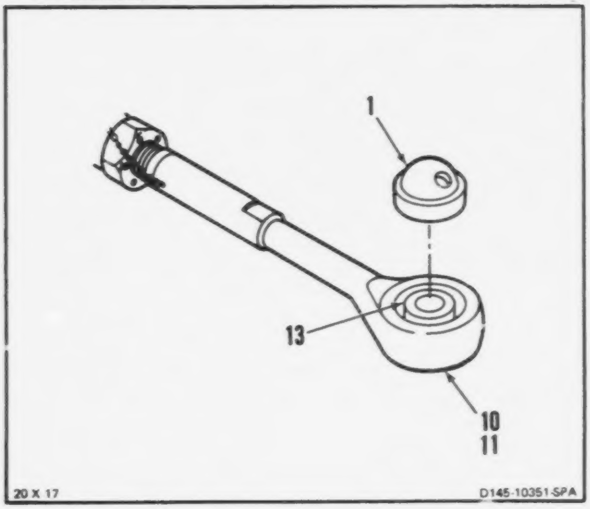
WARNING

Do not stake bearing. Staking marks cause failure of rod-end. This results in injury to personnel and damage to equipment.

CAUTION

Do not press bearing on any surface but outer race. Bearing damage will result.

4. **Press replacement bearing (1) into rod-end (10 or 11).** Install outer race (13) flush with, or below, face of rod-end. Use arbor press and adapter (TM 55-1500-322-24).



INSPECT

GO TO NEXT PAGE

5-98 REPAIR PITCH LINK (Continued) 5-98

5. **Measure pitch link length** from center-to-center of rod-end bearings (1). Record length.

DISASSEMBLE PITCH LINK

6. **Disassemble pitch-link (8)** as follows:

CAUTION

Do not hold rod-end at opposite end of pitch link when checknut is being loosened. Do not turn upper checknut clockwise, or lower checknut counterclockwise to loosen. Damage to pitch link can occur if opposite rod-end is held or nut is overtorqued.

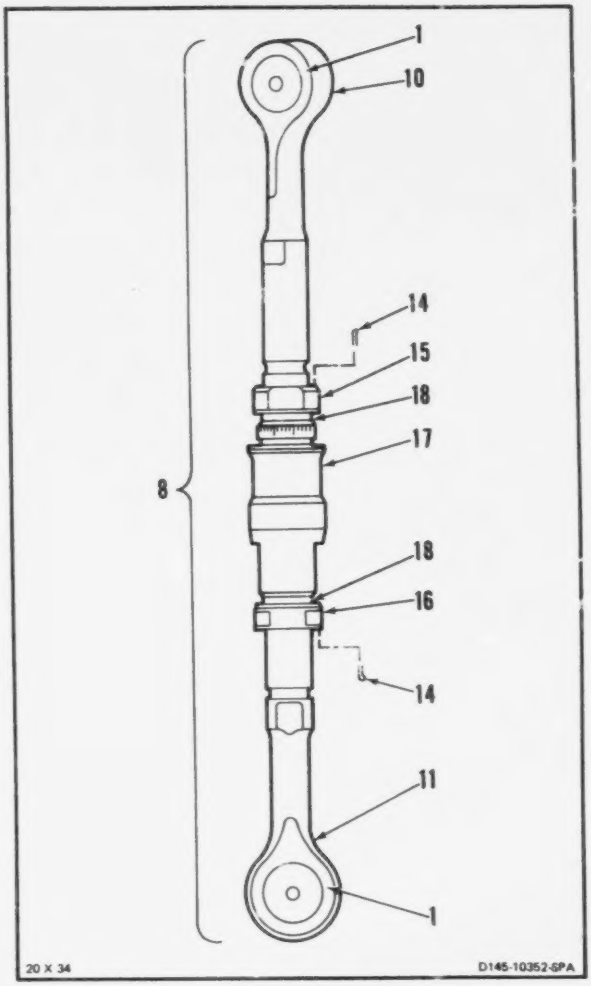
a. Remove lockwire and two cotter pins (14).

b. Hold flats of upper rod-end (10). Turn checknut (15) counterclockwise to loosen.

c. Hold flats of lower rod-end (10). Turn checknut)16) clockwise to loosen.

d. Hold rod-end (10). Turn turnbuckle (17) by hand until rod-ends (10 and 11) are removed.

e. Remove indicator sleeves (18) and checknuts (15 and 16).



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5-98 REPAIR PITCH LINK (Continued) 5-98

CAUTION

Do not allow solvents or particles to enter dry-type bearings. Bearings will be damaged.

7. **Check turnbuckle (17) and rod-ends (10 and 11) for staking marks or cracks.** There shall be no staking marks. If cracks are suspected, follow step 3 a, b, and c.

REPLACE LOCATOR PIN

8. **If locator pin (19) is damaged, replace** as follows:

   a. Drill hole 1/8-inch deep at spread end of pin (19). Use No. 30 drill.

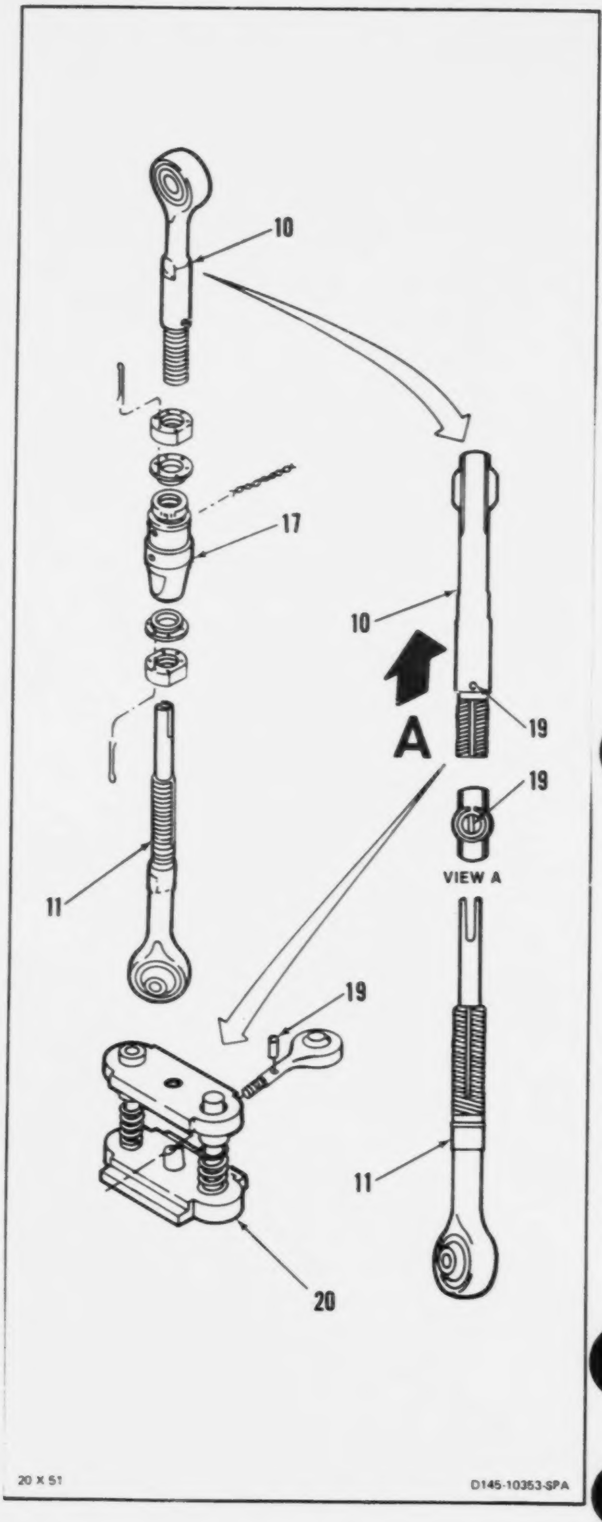
   b. Drive out pin (19). Use 1/8-inch drift punch and hammer.

   c. Remove any pieces of pin (19).

INSPECT

   d. Position replacement pin (19) in rod-end (10).

   e. Spread both ends of pin (19). Use swaging tool (T105) (20) and arbor press.



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ASSEMBLE PITCH LINK

9. **Assemble pitch link (8)** as follows:

   a. Coat thread of rod-ends (10 and 11). Use antiseize compound (E75).

WARNING

Do not install rod-end that has bearing staking marks. Staking marks will cause rod-end failure.

   b. Install left-hand thread checknut (15) onto upper rod-end (10). Install right-hand thread checknut (16) onto lower rod-end (11).

   c. Position indicator sleeves (18) on rod-ends (10 and 11) with flanges (21) toward checknuts (15 and 16).

   d. Fit lower rod-end (11) through tapered end of turnbuckle (17).

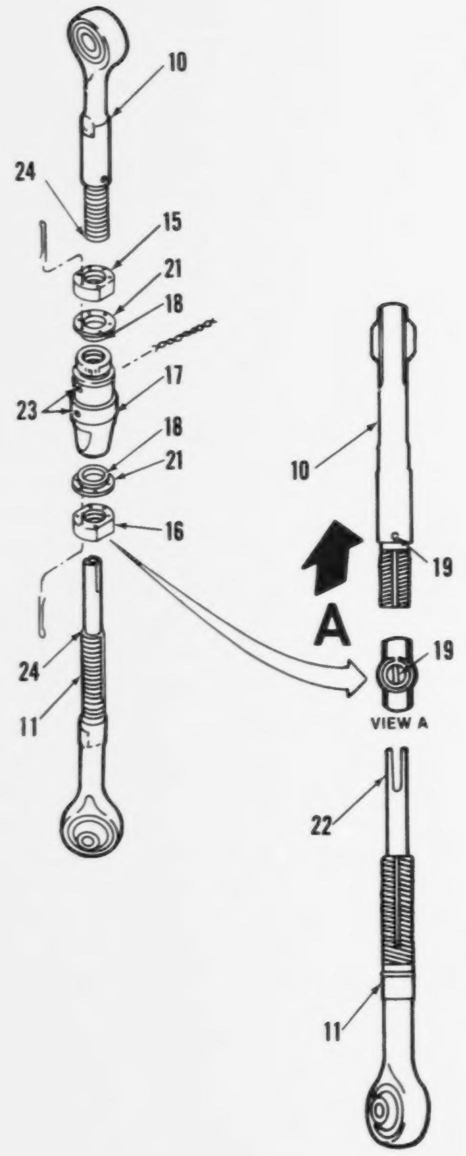
   e. Align fork on lower rod-end with locator pin in upper rod-end.

NOTE

Turnbuckle end with markings has left-hand thread. This screws onto upper rod-end with left-hand thread.

   f. Have helper keep rod-ends (10 and 11) aligned. Screw turnbuckle (17) onto upper rod-end (10). Turnbuckle will also screw onto lower rod-end (11). Fork (22) must be positioned on pin (19).

   g. Check inspection holes (23). Turn turnbuckle (17) until shoulders (24) appear in both holes.



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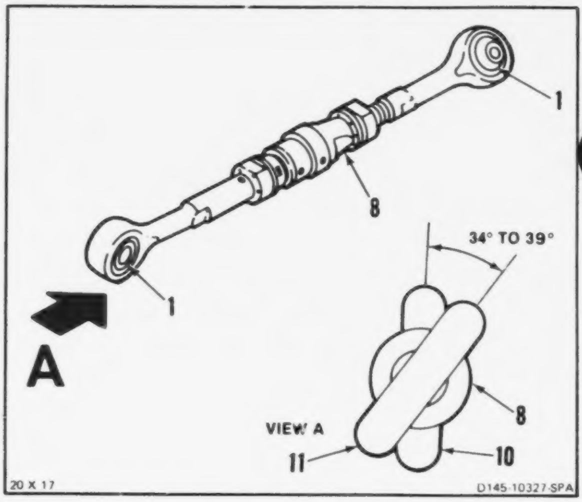
NOTE

Rod-end shoulders visible in both inspection holes indicates that thread engagement is about equal.

h. Adjust length of pitch link (8) from center-to-center of rod-end bearings (1) to length of pitch link removed.

i. If length is unknown, adjust pitch link (8) to 18 3/4-inches.

j. Check that angle between rod-ends (10 and 11) is within 34 and 39 degrees. If angle is not within limits, check for pin or fork damage. Follow steps 7, 8, and 9.



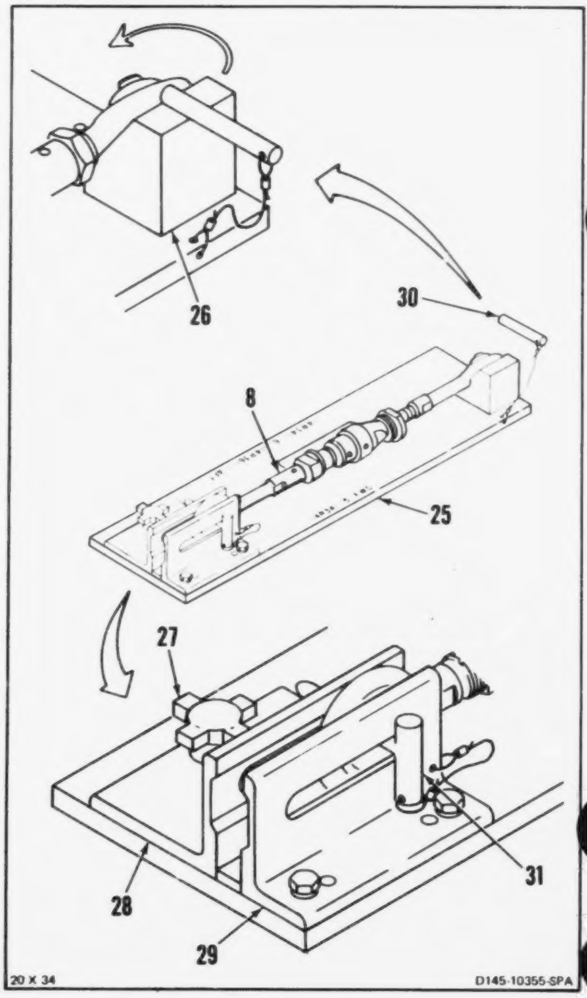
10. **Position pitch link (8) on assembly fixture (T78) (25)** as follows:

a. Position block (26) for forward or aft link (8).

b. Loosen hand knob (27). Move sliding angle (28) clear of fixed angle (29).

c. Position pitch link (8) on fixture (25). Close sliding angle (28). Tighten handknob (27).

d. Install locating pins (30 and 31).

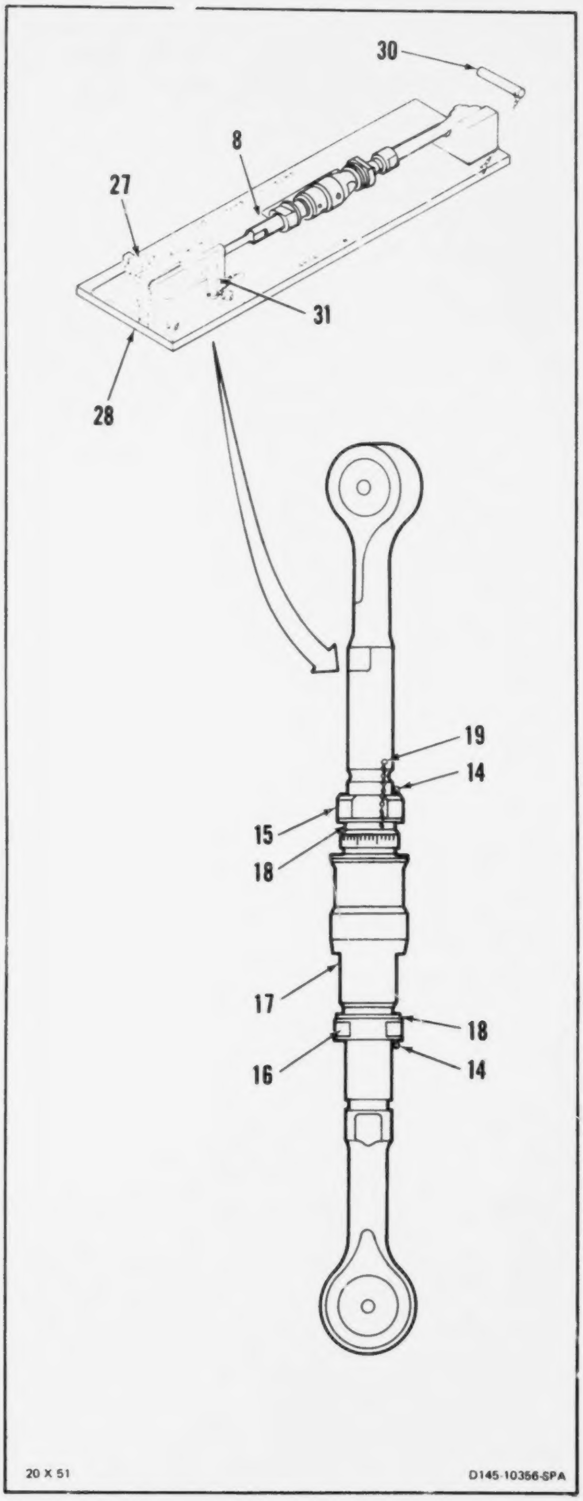


GO TO NEXT PAGE

CAUTION

Do not hold rod-end at opposite end of pitch link when checknut is tightened. Do not turn upper checknut clockwise or lower checknut counterclockwise to tighten. Damage to pitch link can occur.

11. **Torque upper and lower checknuts (15 and 16) to 1050 to 1300 inch-pounds.**
12. Install cotter pins)14). Keep split ends within outside of indicator sleeves (18) to avoid boot damage.
13. Lockwire turnbuckle (17) to hole in pin (19). Use lockwire (E231).
14. **Remove pitch link (8) from assembly fixture (T78) (25)** as follows:
    - a. Remove pins (30 and 31).
    - b. Loosen handknob (27). Move sliding angle (28) clear.
    - c. Remove pitch link (8).



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-99 INSTALL PITCH LINK 5-99

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Torque Wrench, 100 to 750 Inch-Pounds

Materials:
Antiseize Compound (E75)
Gloves (E186)

Parts:
Cotter Pins

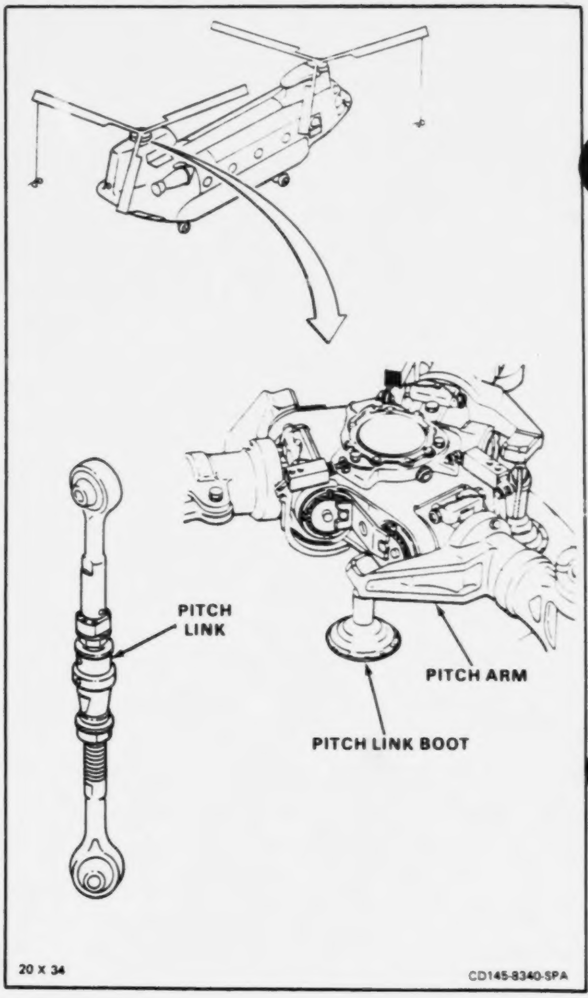
Personnel Required:
67U10 Medium Helicopter Repairer (4)
67U20 Medium Helicopter Repairer
67U30 Inspector

References:
TM 55-1520-240-23P

General Safety Instructions:

WARNING

Antiseize compound (E75) can form toxic vapors if exposed to flame. Use in well-ventilated area, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

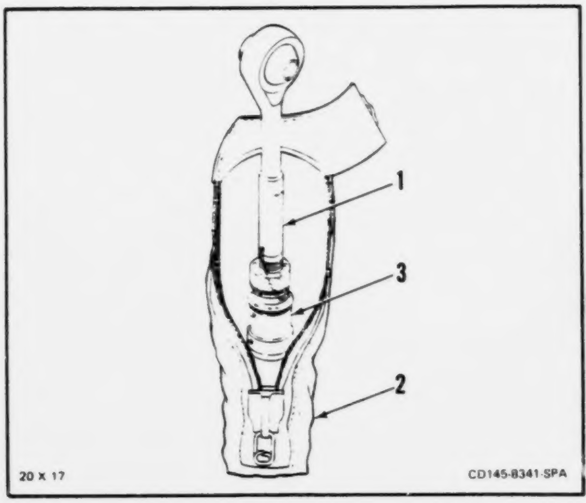


NOTE

- Procedure is same to install forward or aft pitch links. Aft pitch links are shown in task.
- Positive retention bolts are installed in pitch links. They have a pawl which prevents nut or bolt removal unless the pawl is depressed (Task 1-14).
- Pitch link is positioned correctly when markings are above turnbuckle.

CONNECT PITCH LINK UPPER END

1. **Push pitch link (1) up through pitch link boot (2)** until turnbuckle (3) is within narrow part of boot.



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5-99 INSTALL PITCH LINK (Continued) 5-99

2. Remove bolt (4), nut (5), and washer (6). **Position upper rod-end bearing ball (7) in pitch arm (8).** Make sure correct bushing (9) and limiter (9.1) are installed.
3. Lubricate sleeve and shank of bolt (4). Use antiseize compound (E75). Do not lubricate thread. Wear gloves (E186).
4. Install bolt (4), washer (6), and nut (5). **Torque nut to 400 to 660 inch-pounds.** Install cotter pin (10).
5. Have helpers lift and twist blade (11) as required to remove lockpin (12). Keep blade supported.

CAUTION

Do not let the pitch lockpin stay in the pitch arm with the pitch link installed. If the rotary-wing head is turned or the apu started when both a pitch lockpin and pitch link are installed at the same pitch arm, damage to components will occur.

6. **Remove lockpin (T22) (12)** from pitch arm (8).

CONNECT PITCH LINK LOWER END

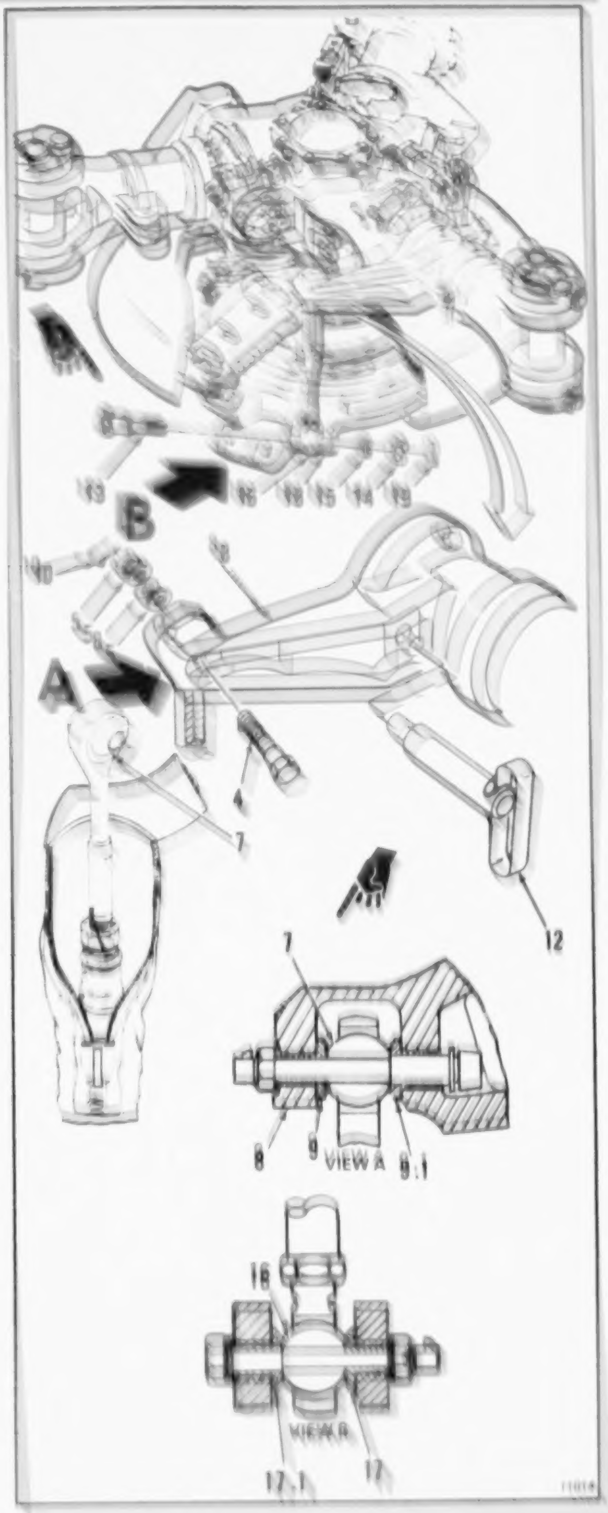
7. Remove bolt (13), nut (14), and washer (15). **Position lower rod-end bearing ball (16) in swashplate lugs (18).** Make sure correct bushing (17) and limiter (17.1) are installed.

NOTE

Do not lubricate thread.

8. Lubricate sleeve and shank of bolt (13). Use antiseize compound (E75).
9. Install bolt (13), washer (15), and nut (14). **Torque nut to 400 to 660 inch-pounds.** Install cotter pin (19).
10. Have helpers lower rotary-wing blade (11).

INSPECT



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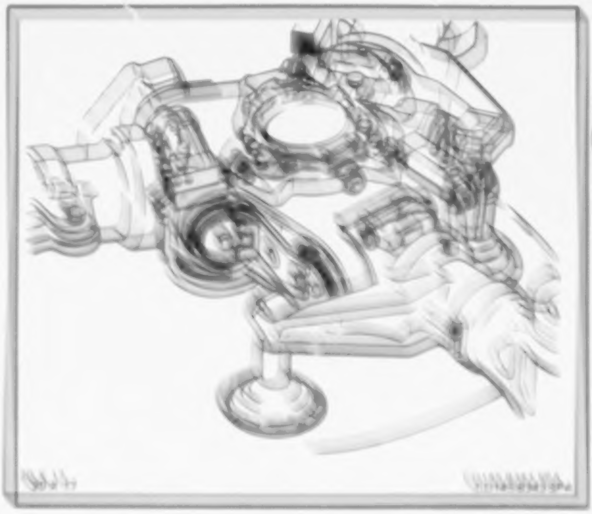
5-99 INSTALL PITCH LINK (Continued) 5-99



FOLLOW-ON MAINTENANCE:

Close pitch link boot (Task 5-135).

Remove safety blocks at dual actuating cylinders (Task 11-29).

Close work platforms (Task 2-2).

Track rotary-wing blades (Task 5-140 and 5-141).

END OF TASK

5-99.1 PITCH LINK BOLT TORQUE CHECK 5-99.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692

Torque Wrench, 100 to 750 Inch-Pounds

Materials:

None

Parts:

Cotter Pins

Personnel Required:

Medium Helicopter Repairer (S)

References:

Task 5-94.1

TM 55-1520-240-23P

Equipment Condition:

Battery Disconnected (Task 1-39)

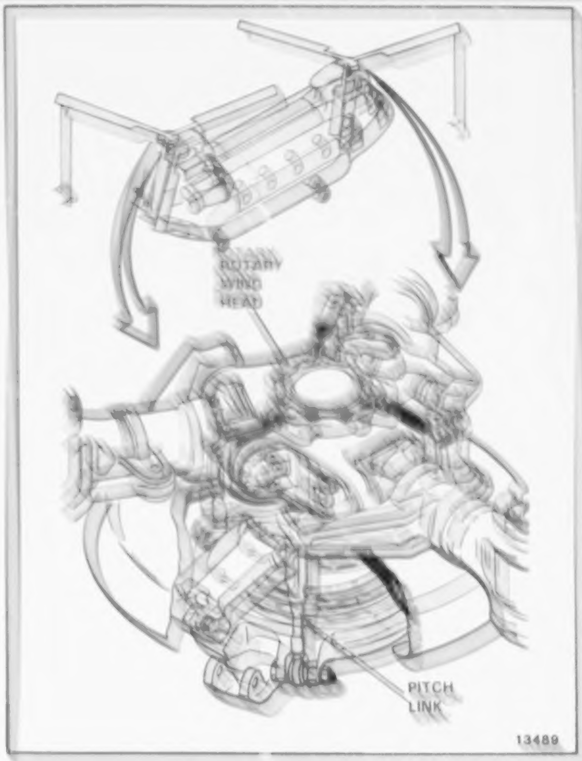
Electrical Power Off

Hydraulic Power Off

Forward and Aft Work Platforms Open (Task 2-2)

Cockpit Flight Controls at Neutral (Task 11-33)

Tiedown Line Installed on One Forward and One Aft Blade



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NOTE

Torque on nuts at upper and lower bolts is checked in the same way for all pitch links.

1. **Inspect pitch link (1)** for looseness or damage caused by chafing. Inspect bearing (2) at each end of link for liner unbonding and signs of seizing.
2. Remove cotter pin (3) at each end of link (1).
3. **Apply 400 inch-pounds torque to nuts (4 and 5)** in the tightening direction.

NOTE

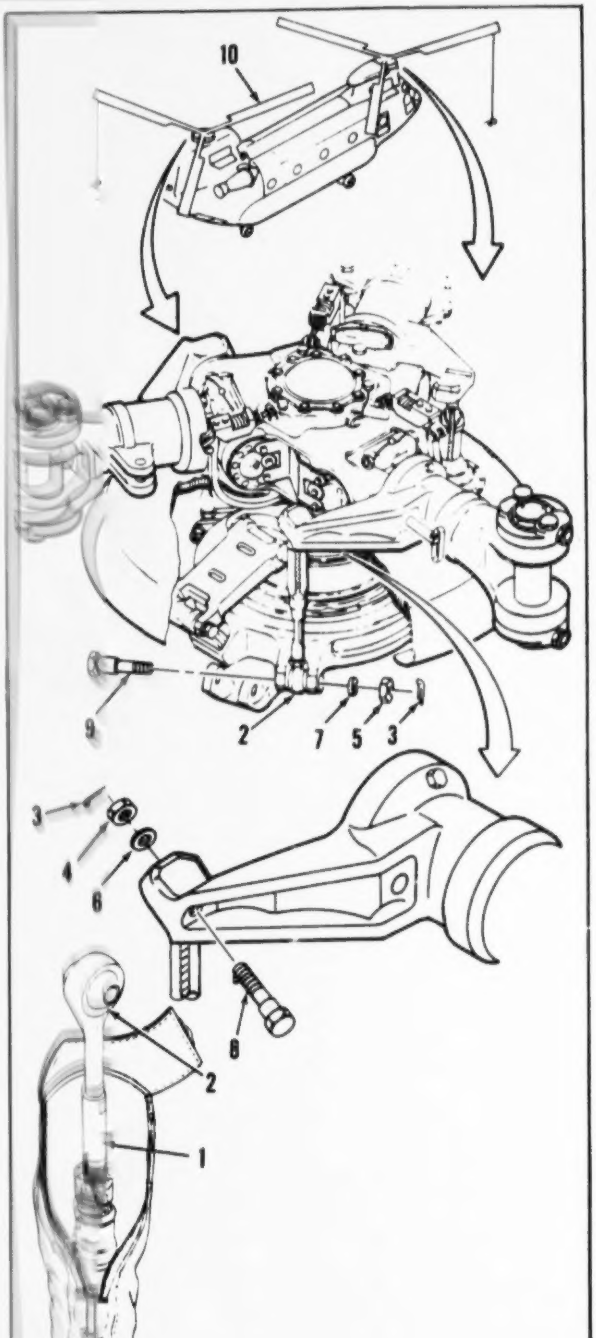
The nuts should not move.

4. If nuts (4 and 5) did not move during torque check, install a new cotter pin (3). Go to FOLLOW-ON MAINTENANCE.
5. **If nuts (4 or 5) moved** during torque check, **remove nut, washer (6 or 7), and bolt (8 or 9)** (Task 5-94-1).
6. **Inspect bolt (8 or 9) for obvious wear.** If bushing has damage, it may be reworked (Task 1-14). If shank of bolt has scratches or other damage 0.005 inch deep or more, or has a wear step of 0.005 inch or more, replace bolt (Task 5-94.1).
   a. Have helpers lift and twist blade (10) as required to install bolt (8 or 9). Keep blade supported.
   b. **Install new bolt (8 or 9)**, washer (6 or 7), and new nut (4 or 5). Check that limiter is installed. **Torque nut to 400 to 660 inch-pounds.** Install cotter pin (3).
7. Have helpers lower rotary-wing blade (10).

INSPECT

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-99.1 PITCH LINK BOLT TORQUE CHECK (CONTINUED) 5-99.1

7. Have helpers lower rotary-wing blade (11).

INSPECT

FOLLOW-ON MAINTENANCE:
None

END OF TASK

5-99.2 CHECK DRIVE COLLAR AND DRIVE ARM RADIAL PLAY 5-99.2

INITIAL SETUP

Applicable Configurations:

ALL

Tools:

Technical Inspection Tool Kit, NSN 5180-00-323-5114

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Dial Indicating Scale, 0 to 50 Pounds

Dial Indicator, 0 to 0.002 Inch

Materials:

Antiseize Compound (E75)

Gloves (E186)

Parts:

Cotter Pin

Personnel Required:

Aircraft Powertrain Repairer

Inspector

Equipment Condition:

Battery Disconnected (Task 1-39)

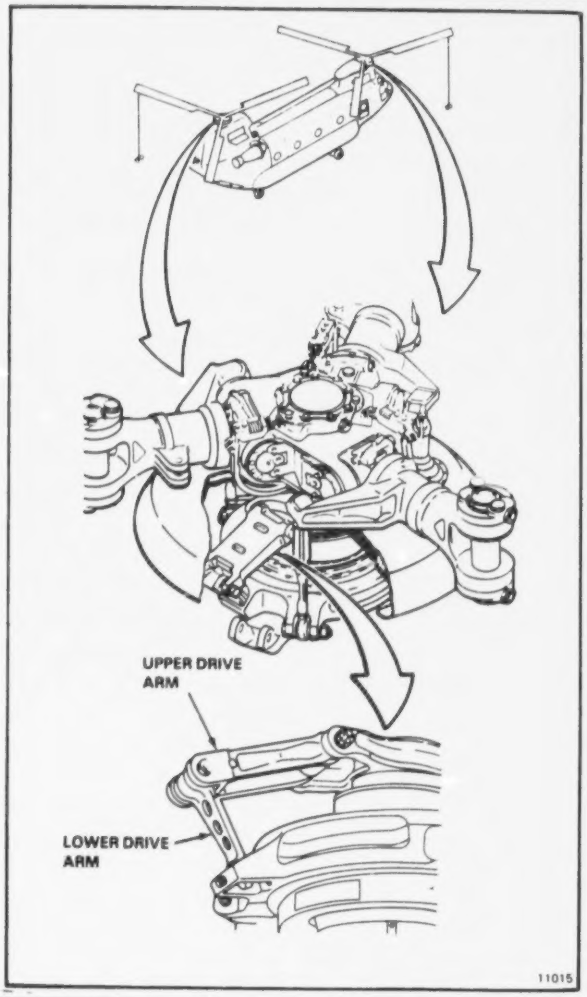
Hydraulic Power Off

Electrical Power Off

Cockpit Controls at Neutral (Task 11-42)

Forward or Aft Work Platforms Open (Task 2-2)

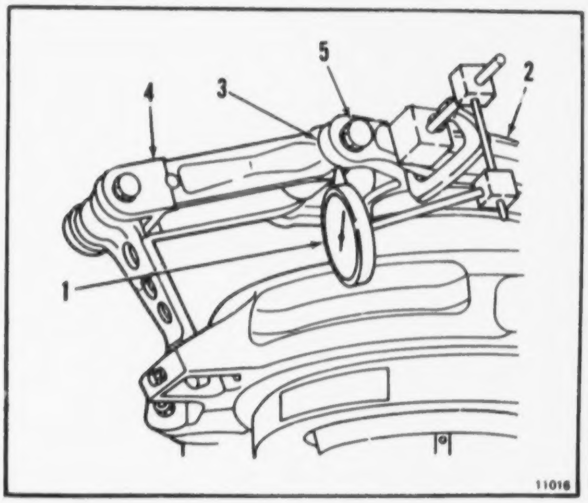
Pitch Links Disconnected



NOTE

Procedure is same to check forward or aft drive collar and drive arm for radial play.

1. Clamp dial indicator (1) to drive arm collar (2).
2. **Position indicator (1) on lug (3)** of upper drive arm (4), aligned with bolt (5). Preload indicator against lug.
3. **Pull arm (4) and collar (2) toward indicator (1).** Record indicator reading X.
4. **Hold collar (2) down and push arm (4) away from indicator (1).** Record indicator reading Y.
5. Subtract reading Y from reading X. Result shall not be more than 0.010 inch.
6. Remove indicator (1) from drive arm collar (2)



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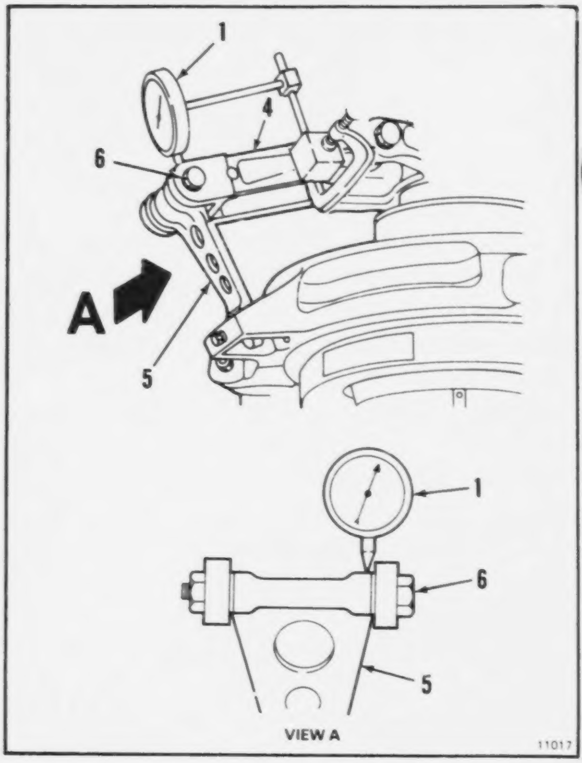
5-99.2 CHECK DRIVE COLLAR AND DRIVE ARM RADIAL PLAY (Continued) 5-99.2

7. Clamp indicator (1) to drive arm (4).
8. **Position indicator on lower drive arm (5),** aligned with bolt (6). Preload indicator against arm.
9. **Pull arm (4) and arm (5) away from indicator (1).** Record indicator reading A.
10. **Hold arm (4) down and push arm (5) toward indicator (1).** Record reading B.
11. Subtract reading A from reading B. Result shall not be more than 0.010 inch.
12. Remove indicator (1) from arm (4).



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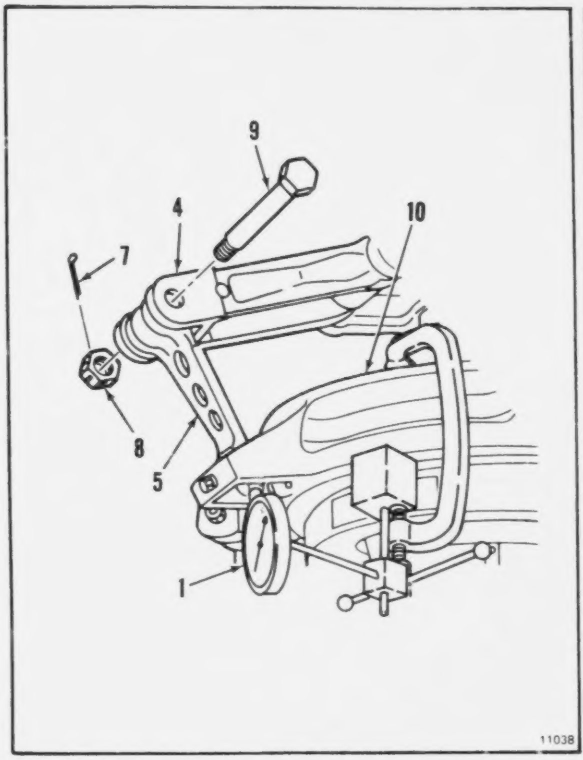
5-99.2 CHECK DRIVE COLLAR AND DRIVE ARM RADIAL PLAY (Continued) 5-99.2

13. **Remove** cotter pin (7), and nut (8) from **bolt (9)**. Remove bolt.
14. Clamp indicator (1) to swashplate (10).
15. **Position indicator (1) on lower end of arm (5),** align with arm. Reload indicator against arm.
16. **Push arm (5) toward indicator (1).** Record indicator reading C.
17. **Hold swashplate (10) down and pull arm (5) away from indicator (1).** Record indicator reading D.
18. Subtract reading D from reading C. Result shall not be more than 0.006 inch.
19. **Remove indicator (1)** from swashplate (10).
20. **Position arm (5)** in arm (4).
21. **Apply antiseize compound to grip of bolt (9).** Wear gloves (E186). Do not apply to thread or bushing on bolt.
22. **Install bolt (9)** and nut (8) in arm (5). Torque nut to 500 to 700 inch-pounds.
23. Install cotter pin (7) in nut (8).



INSPECT

FOLLOW-ON MAINTENANCE:

Close forward or aft work platforms (Task 2-2).

END OF TASK

5-100 REMOVE DRIVE COLLAR 5-100

INITIAL SETUP

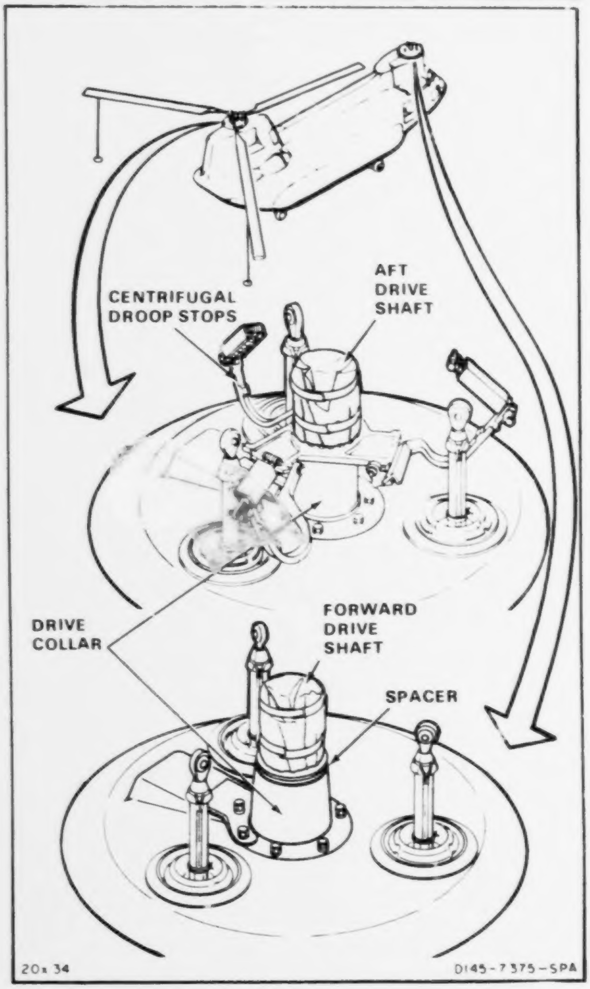
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Materials:
None

Personnel Required:
67U10 Medium Helicopter Repairer (2)

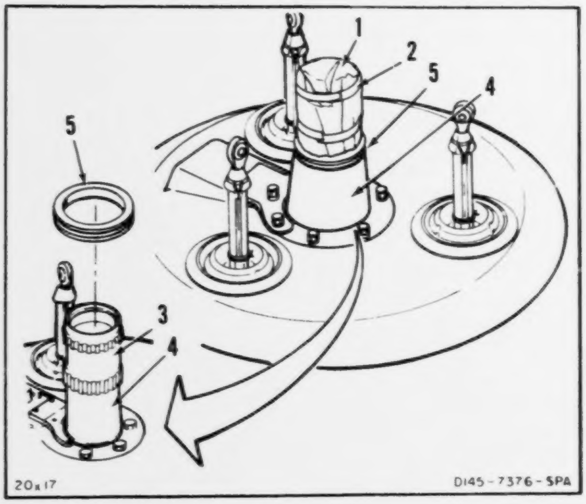
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Two Rotary-Wing Blades Tied Down (Task 1-26)
Forward or Pylon Work Platforms Open (Task 2-2)
Rotary-Wing Blades Removed (Task 5-64)
Rotary-Wing Head Removed (Task 5-8)
Pitch Links Disconnected From Swashplate (Task 5-97)


CENTRIFUGAL DROOP STOPS
AFT DRIVE SHAFT
DRIVE COLLAR
FORWARD DRIVE SHAFT
SPACER
20x 34
D145-7375-SPA

NOTE

Procedure is similar to remove forward and aft drive collars. Differences are noted in text.

1. If installed, remove barrier material (1) and tape (2) from drive shaft (3).
2. For forward drive collar (4) only, **remove spacer (5)** from drive shaft (3). Then go to step 4.


1
2
5
4
5
3
4
20x17
D145-7376-SPA

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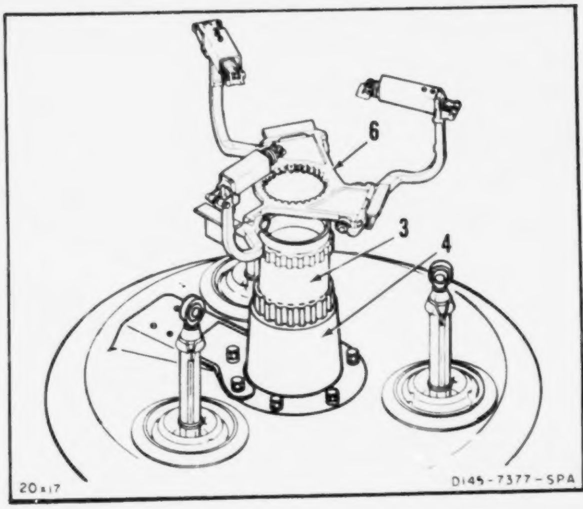
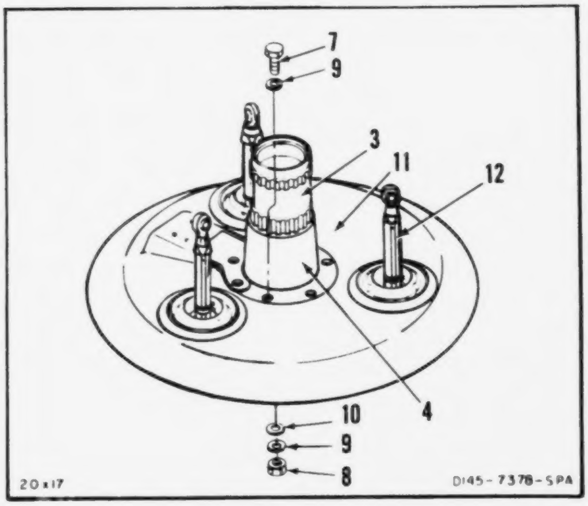
5-100 REMOVE DRIVE COLLAR (Continued) 5-100

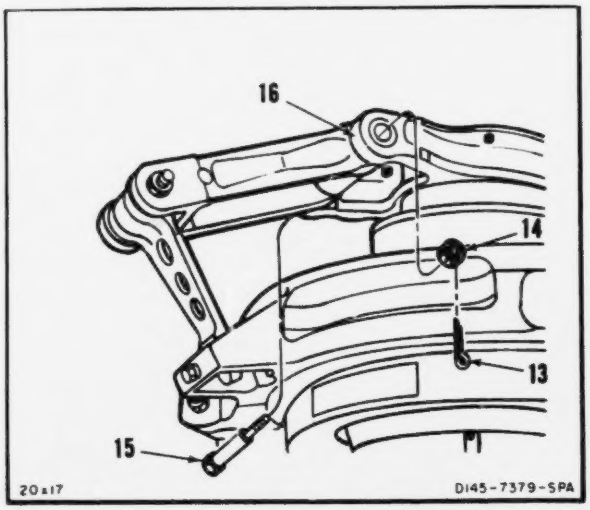
3. For aft drive collar (4) only, **remove centrifugal droop stop (6)** from drive shaft (3).


6
3
4
20x17
D145-7377-SPA

4. **Remove 8 bolts (7),** 8 nuts (8), and 24 washers.
5. Rotate weather protective cover (11) slightly, in both directions, to free cover from drive collar (4).
6. With helper, lift cover (11) and three pitch links (12) carefully over drive shaft (3). **Remove cover.**


7
9
3
11
12
4
10
9
8
20x17
D145-7378-SPA

7. Remove cotter pin (13) and nut (14) from bolt (15) in drive collar lugs (16).
8. **Remove bolt (15).** Tap with plastic mallet, if necessary.


16
14
13
15
20x17
D145-7379-SPA

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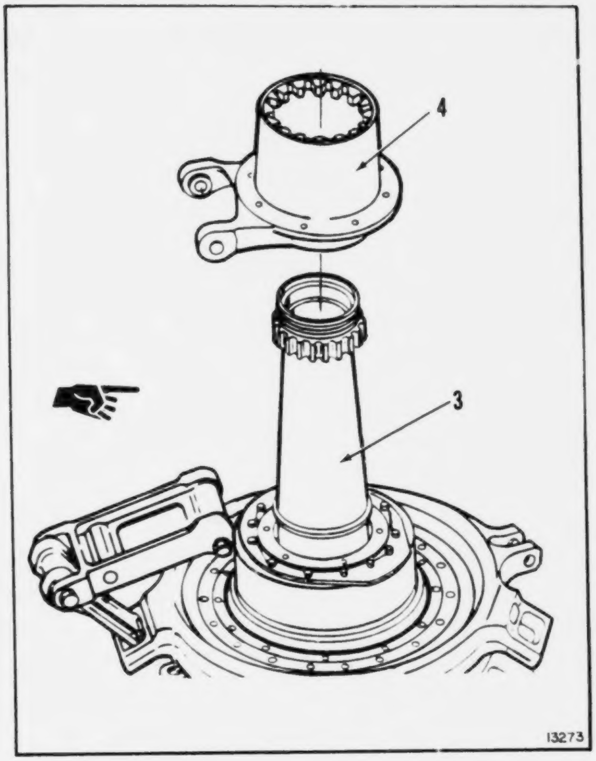
5-100 REMOVE DRIVE COLLAR (Continued) 5-100

9. **Remove drive collar (4)** from drive shaft (3).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-101 REMOVE DRIVE ARMS 5-101

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Rod, 1/8-Inch Diameter x 6 Inches Long

Materials:
None

Personnel Required:
67U10 Medium Helicopter Repairer

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Pitch Links Disconnected From Swashplate (Task 5-97)
One Forward and One Aft Blade Tied Down (Task 1-26)
Pylon or Forward Work Platforms Open (Task 2-2)

General Safety Instructions:

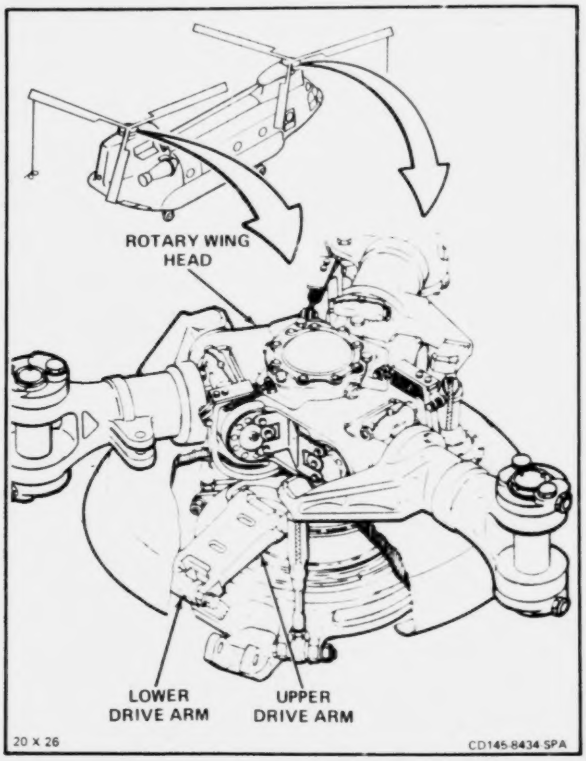
CAUTION

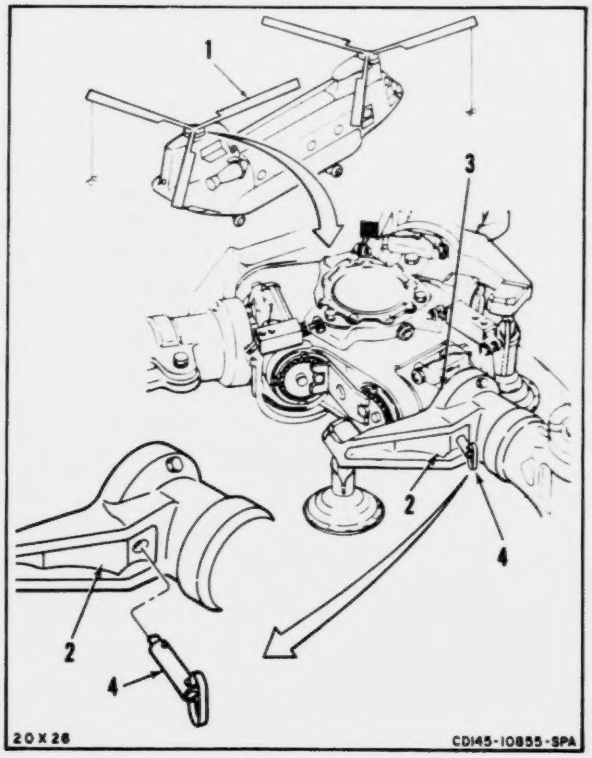
Do not try to pry bolts free. Swashplate, drive arm, or drive collar will be damaged.

NOTE

- Procedure is same to remove forward or aft drive arms. Removal of aft drive arms is shown here.
- Impedance bolts are installed in upper and lower drive arm joints. These bolts are self-retaining and require a special nut and torque (Task 1-14).

1. Support and twist blade (1) as required to align holes in pitch arm (2) and pitch shaft (3). Install lockpin (4). Lower blade.





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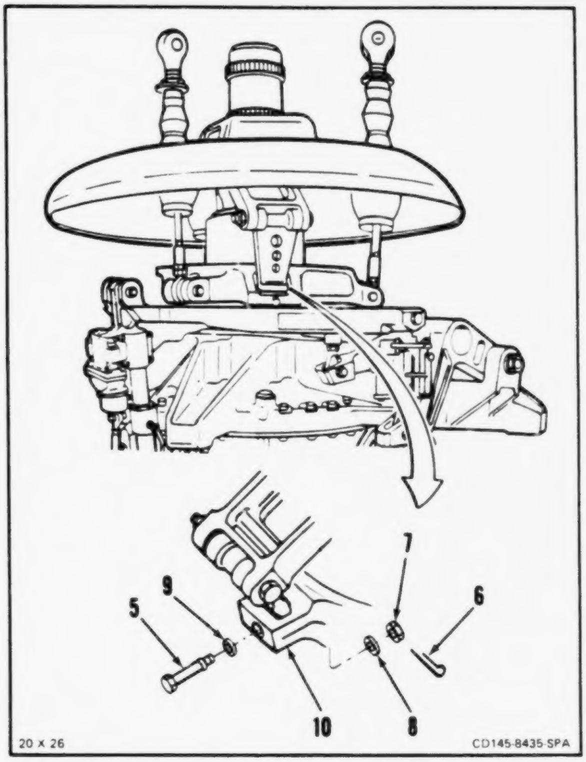
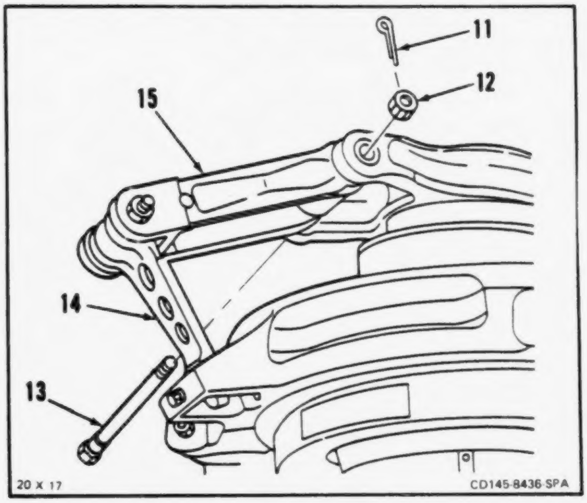
REMOVE UPPER AND LOWER DRIVE ARMS


5
9
7
6
10
8
20 x 26
CD145-8435-SPA

2. Remove lockwire from bolt (5). Remove cotter pin (6), nut (7), and washers (8 and 9) from swashplate (10).
3. **Remove bolt (5).** Use rod through head of bolt.


11
12
15
14
13
20 x 17
CD145-8436-SPA

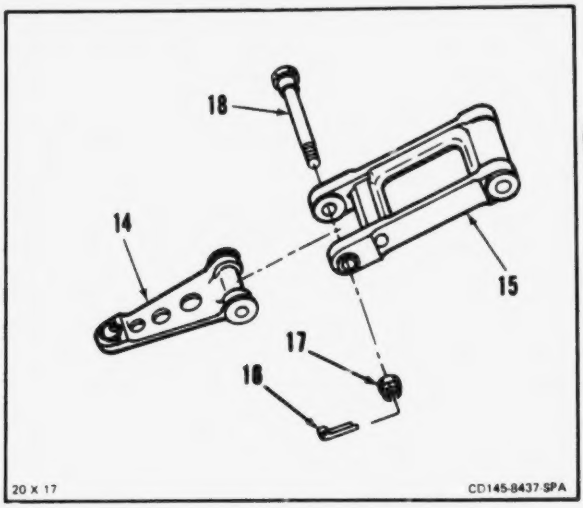
4. Remove cotter pin (11) and nut (12) from bolt (13).
5. **Remove bolt (13).** Tap bolt with plastic mallet if needed.
6. Remove drive arms (14 and 15).

GO TO NEXT PAGE

5-101 REMOVE DRIVE ARMS (Continued) 5-101

DISASSEMBLE DRIVE ARMS

7. Remove cotter pin (16) and nut (17) from bolt (18).
8. **Remove bolt (18).** Tap bolt with plastic mallet if needed.
9. **Remove lower drive arm (14) from upper drive arm (15).**


18
14
15
17
16
20 X 17
CD145-8437 SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-102 DISASSEMBLE DRIVE COLLAR (AVIM) 5-102

INITIAL SETUP

Applicable Configurations:
All

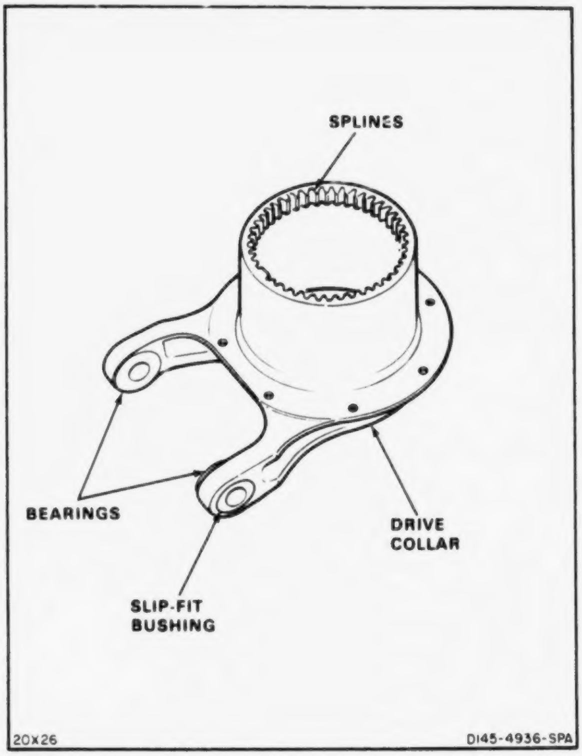
Tools:
Arbor Press
Adapter (Appx E-8)

Materials:
None

Personnel Required:
68D10 Aircraft Powertrain Repairer
68D20 Aircraft Powertrain Repairer

References:
Appendix E
TM 55-1500-322-24

Equipment Condition:
Off Helicopter Task


SPLINES
BEARINGS
DRIVE COLLAR
SLIP-FIT BUSHING
20X26
DI45-4936-SPA

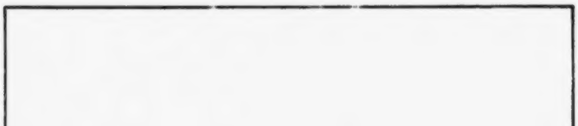
NOTE

Procedure is same to disassemble forward or aft drive collar.

1. If installed, **remove bushing (1)** from drive collar lug (2).
2. **Press two bearings (3) from lugs (2).** Use arbor press and adapter (TM 55-1500-322-24).

FOLLOW-ON MAINTENANCE:

None


2
3
2
1
20X26
DI45-4937-SPA

END OF TASK

5-103 INSPECT DRIVE COLLAR (AVIM) 5-103

INITIAL SETUP

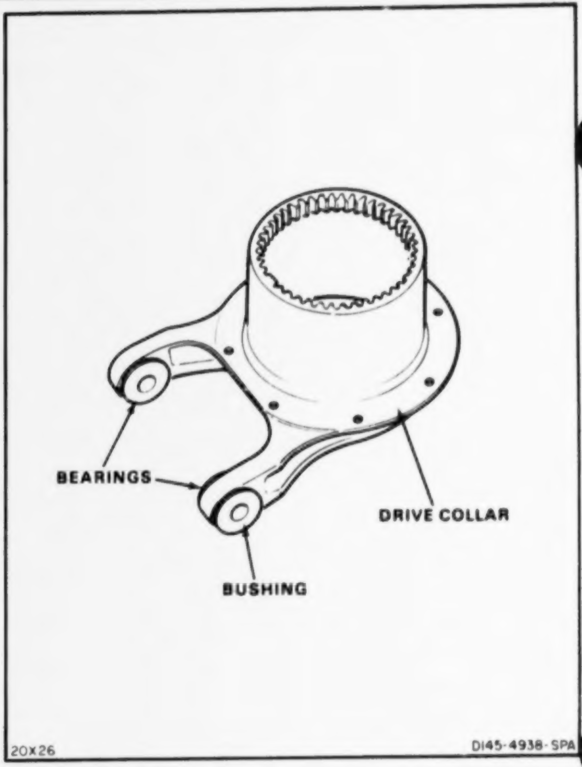
Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Vernier Caliper
Pins, Two 0.180 Inch

Materials:
None

Personnel Required:
68D30 Inspector

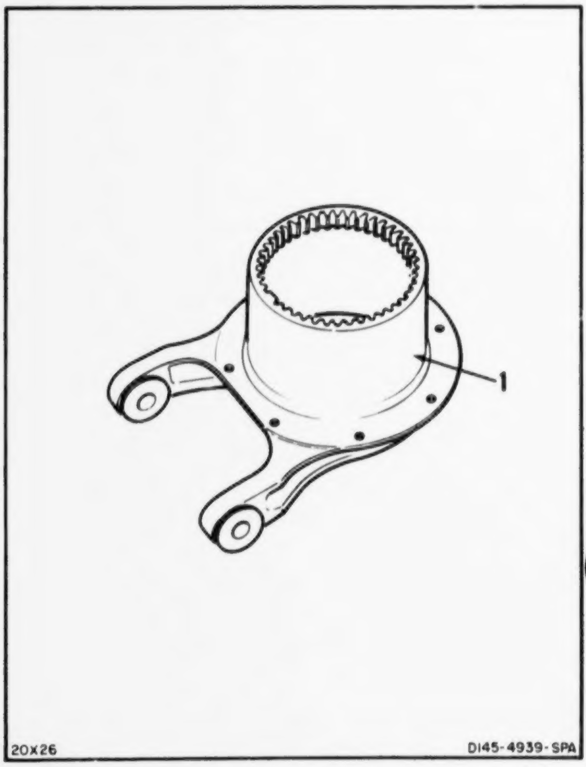
Equipment Condition:
Off Helicopter Task


BEARINGS
DRIVE COLLAR
BUSHING
20X26
DI45-4938-SPA

NOTE

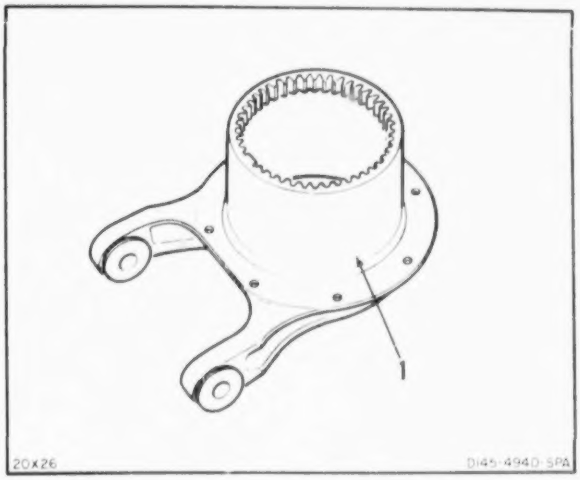
Procedure is same to inspect forward or aft drive collar.

1. **Check all areas of drive collar (1) for cracks.** There shall be no cracks.

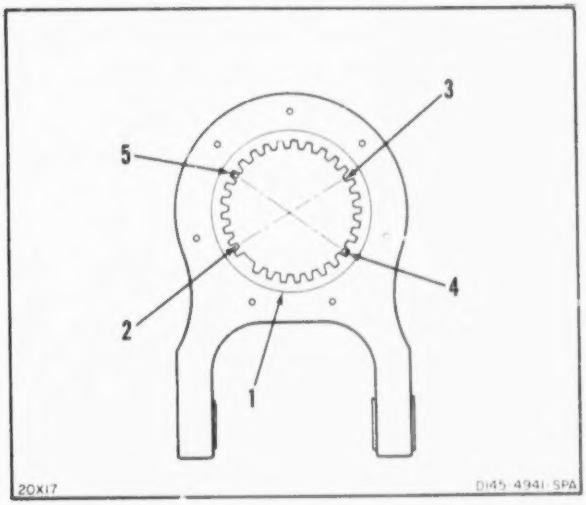

1
20X26
DI45-4939-SPA

GO TO NEXT PAGE

2. **Check all surfaces of collar (1) for other damage.** Damage which does not exceed 0.005-inch in depth shall be accepted without rework. Damage between 0.005-inch and 0.040-inch in depth shall be blend repaired. Depth of blend repair shall not exceed 10 percent of material thickness, or 0.040-inch, whichever is less. Blend radius must be 1 inch minimum



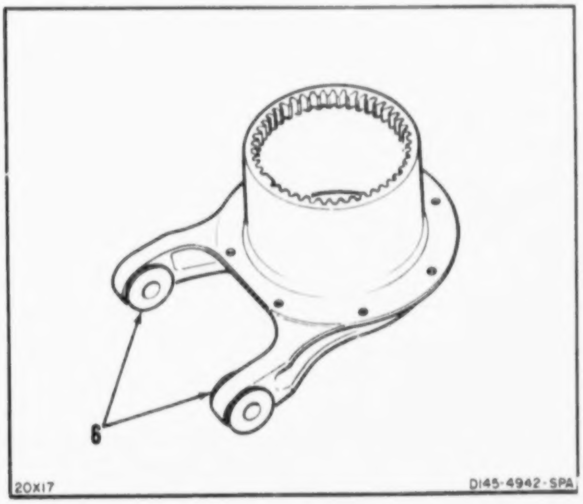
3. **Check inside dimensions of drive collar (1)** as follows:
   a. Apex (2) to apex (3) shall not exceed 5.380 inches.
   b. Pin (4) to pin (5) shall not exceed 5.465 inches using 0.180-inch diameter pins.



4. **Check teflon coating on bearings (6).** Coating shall not be scored, torn or frayed.

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-104 ASSEMBLE DRIVE COLLAR (AVIM)

INITIAL SETUP

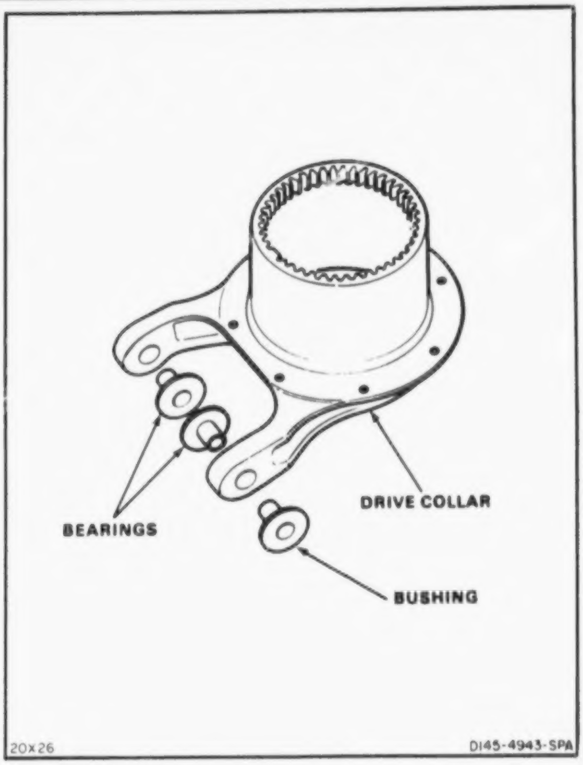
Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Arbor Press
Adapter (Appx E-9)

Materials:
Epoxy Primer (E293)
Gloves (E186)

Personnel Required:
68D10 Aircraft Powertrain Repairer
68D20 Aircraft Powertrain Repairer
68D30 Inspector

References:
TM 55-1520-240-23P
TM 55-1500-322-24
Appendix E



WARNING

Epoxy primer (E293) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

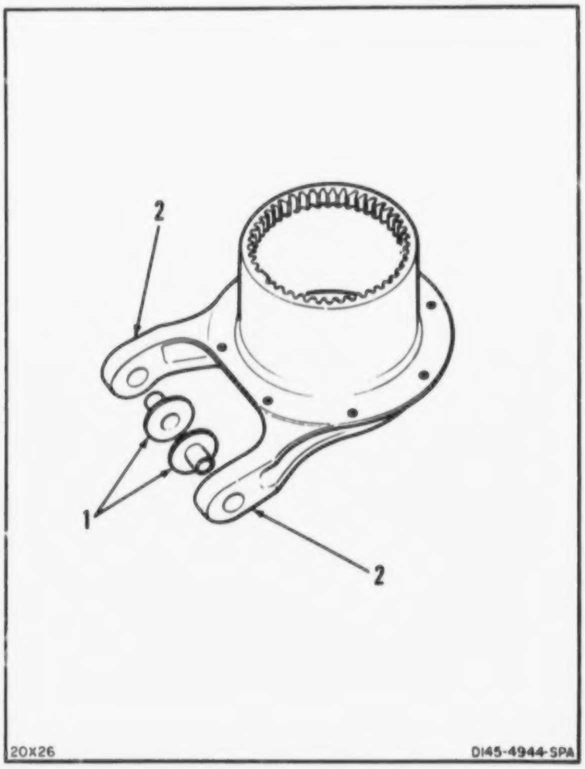
CAUTION

Do not lubricate bearings. Do not apply primer to inside diameter of bearings. Coating of bearing can be damaged.

NOTE

Procedure is same to assemble forward or aft drive collar.

1. Apply epoxy primer (E293) to outside diameter of bearings (1) and bore of lugs (2). Use gloves (E186).
2. **Press bearings (1) into lugs (2).** Use arbor press and adapter (TM 55-1500-322-24).



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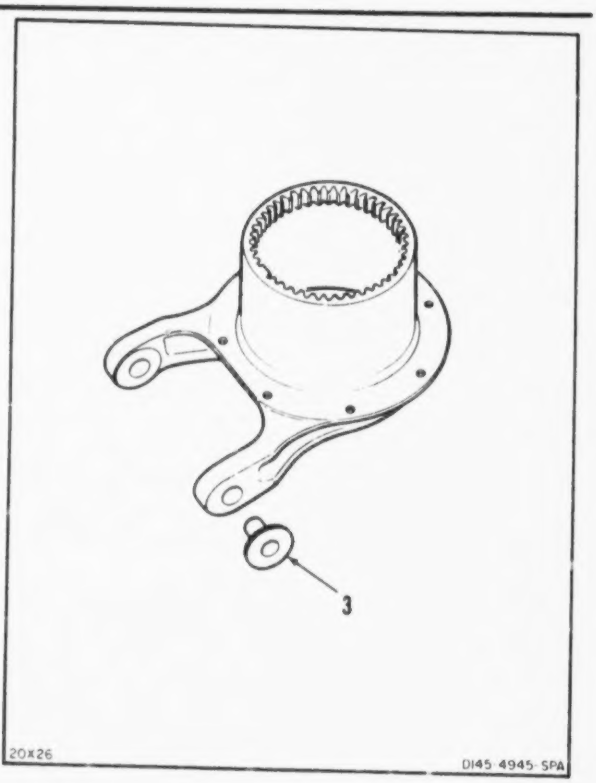
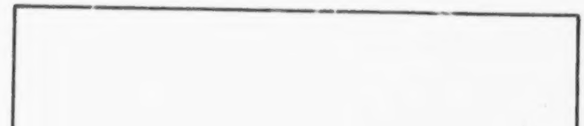
3. **Install bushing (3).**

INSPECT


3
20x26
DI45-4945-SPA

FOLLOW-ON MAINTENANCE:

None


20x26
DI45-4946-SPA

END OF TASK

5-105 DISASSEMBLE UPPER DRIVE ARM (AVIM)

INITIAL SETUP

Applicable Configurations:
ALL

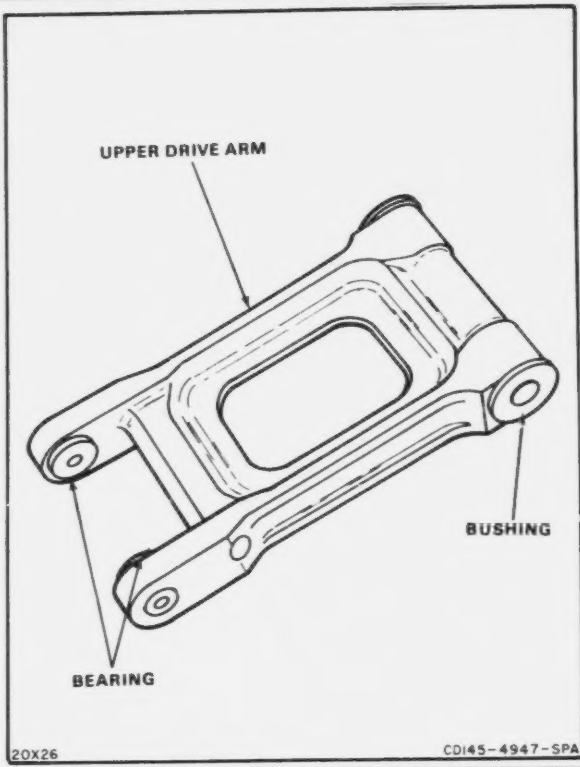
Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Arbor Press
Adapter (Appx E-8)
Heat Gun
Kevlar Gloves (E187)
Slide Hammer

Materials:
Temperature Indicating Strips (E413)

Personnel Required:
Aircraft Powertrain Repairer (2)

References:
Appendix E
TM 55-1500-322-24

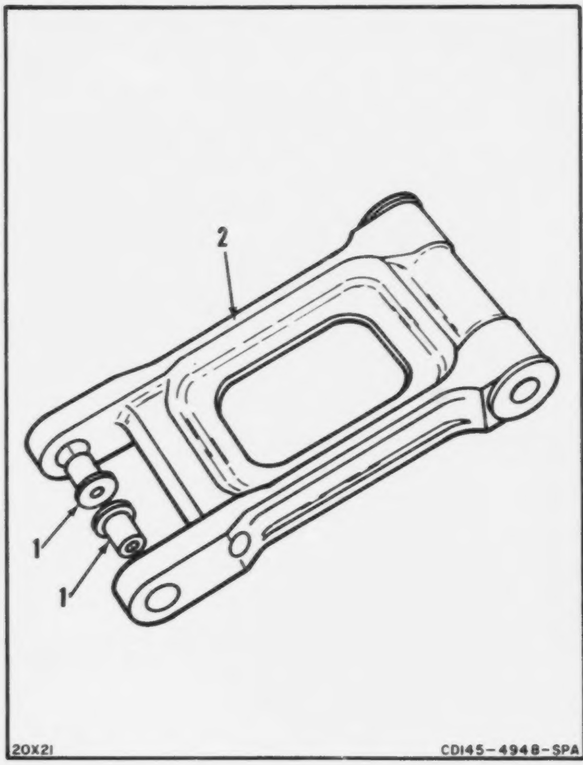
Equipment Condition:
Off Helicopter Task


UPPER DRIVE ARM
BUSHING
BEARING
20X26
CDI45-4947-SPA

NOTE

Procedure is same to disassemble forward or aft upper drive arm.

1. **Press two bearings (1) from upper drive arm (2).** Use arbor press and adapter (TM 55-1500-322-24).


2
1
1
20X21
CDI45-4948-SPA

GO TO NEXT PAGE

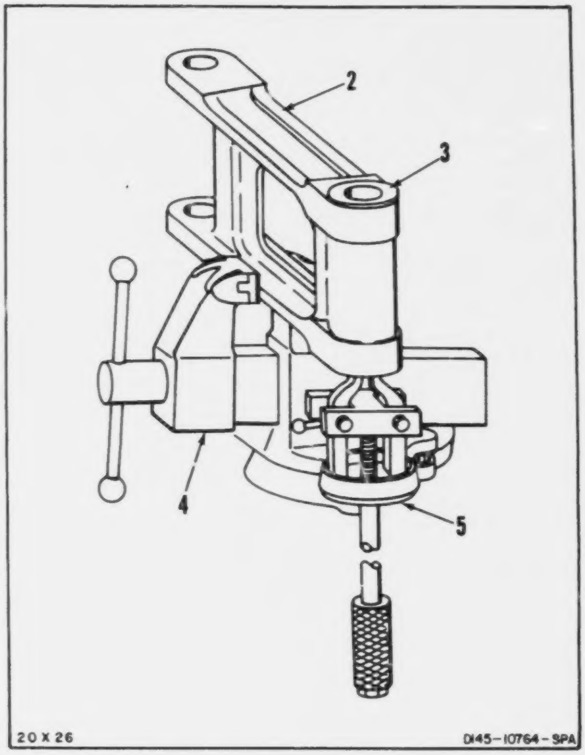
5-105 DISASSEMBLE UPPER DRIVE ARM (AVIM) (Continued) 5-105

WARNING

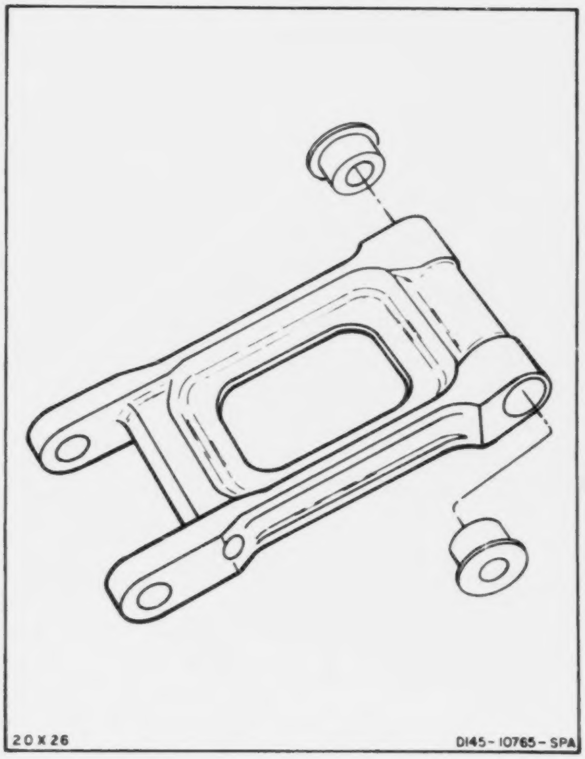
Avoid contact with heated parts. Heated parts can cause injury to personnel.

2. **Heat arm (2) to 225° F (107° C)** around bushings (3). Use electric heat gun. Monitor temperature. Use temperature indicating strips (E413). Wear gloves (E187).

3. **Install arm (2) in machinists vise (4).**
4. Position slide hammer (5) in bushing (3). **Remove bushing.**
5. Repeat steps 3 and 4 for other bushing (3).



20 X 26 D145-10764-SPA



20 X 26 D145-10765-SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-106 INSPECT UPPER DRIVE ARM (AVIM) 5-106

INITIAL SETUP

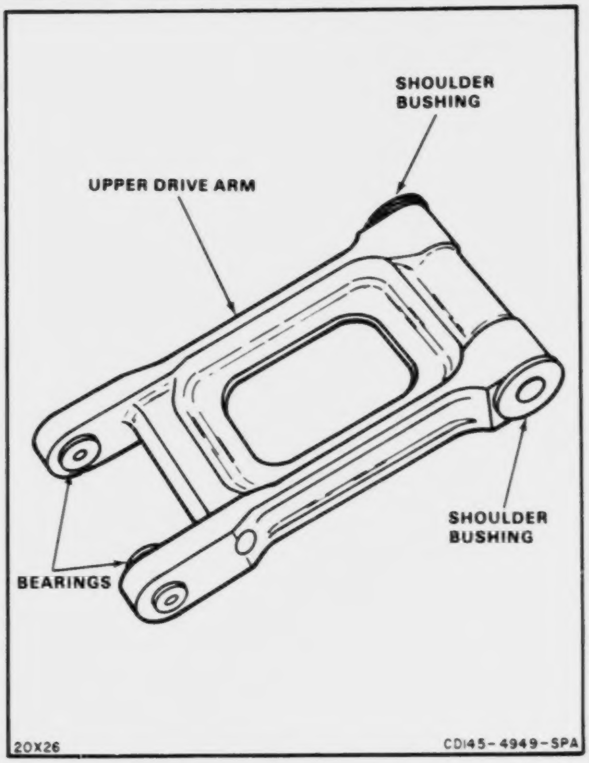
Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Personnel Required:
68D30 Inspector

References:
TM 55-1520-240-23P
TM 55-1500-322-24

Equipment Condition:
Off Helicopter Task



NOTE

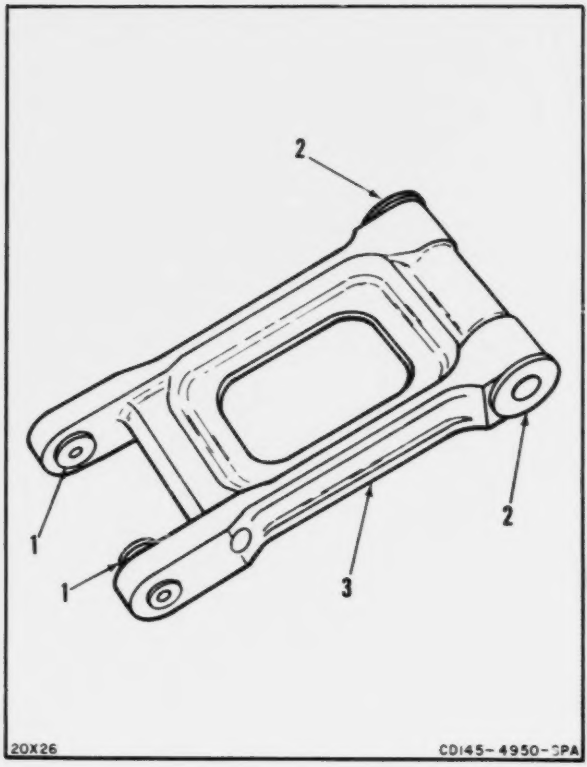
Procedure is same to inspect forward or aft upper drive arm.

1. **Check teflon coating on two bearings (1).** Coating shall not be torn, scored, or frayed.
2. **Check two shoulder bushings (2) in upper arm (3).** Bushings shall not be loose.
3. **Measure inside diameter of bearings (1) and bushings (2).** Maximum inside diameter shall not exceed 0.752 inches.
4. **Check all surfaces of drive arm (3)** for scratches, pits, or other damage. Damage which does not exceed 0.005-inch in depth shall be accepted without rework. Damage between 0.005-inch in depth and 0.040-inch in depth shall be blend repaired. Depth of blend repair shall not exceed 0.040-inch or 10 percent of material thickness, whichever is less. Blend radius must be 1-inch minimum.

FOLLOW-ON MAINTENANCE:

None

END OF TASK



5-107 ASSEMBLE UPPER DRIVE ARM (AVIM) 5-107

INITIAL SETUP

Applicable Configurations:

All

Tools:

Kevlar Gloves (E187)
Arbor Press
Adapter (Appx E-9)
Two-Quart Container

Materials:

Dry Cleaning Solvent (E162)
Cloth (E120)
Epoxy Primer (E293)
Gloves (E186)
Dry Ice (E92)
Methanol (E243)
Liquid Nitrogen (E247) (Alternate Coolant)

Personnel Required:

Aircraft Powertrain Repairer (2)
Machinist
Inspector

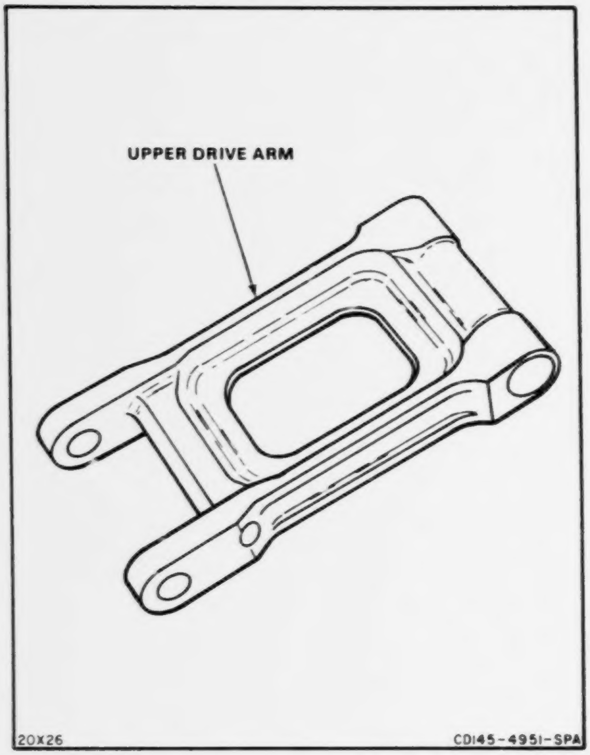
References:

TM 55-1520-240-23P
TM 55-1500-322-24
Appendix E

General Safety Instructions:

WARNING

Epoxy primer (E293) and dry cleaning solvent (E162) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes . Get medical attention for eyes.



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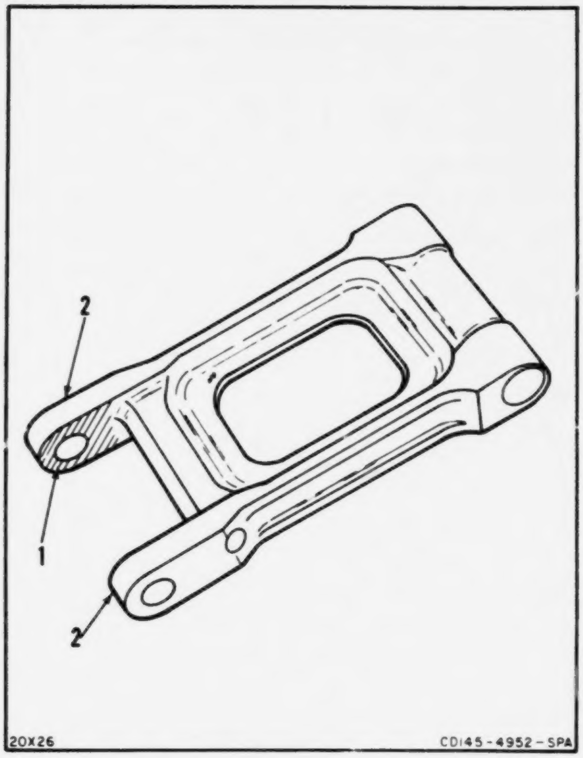
5-107 ASSEMBLE UPPER DRIVE ARM (AVIM) (Continued) 5-107

NOTE

Procedure is same to assemble forward or aft upper drive arm.

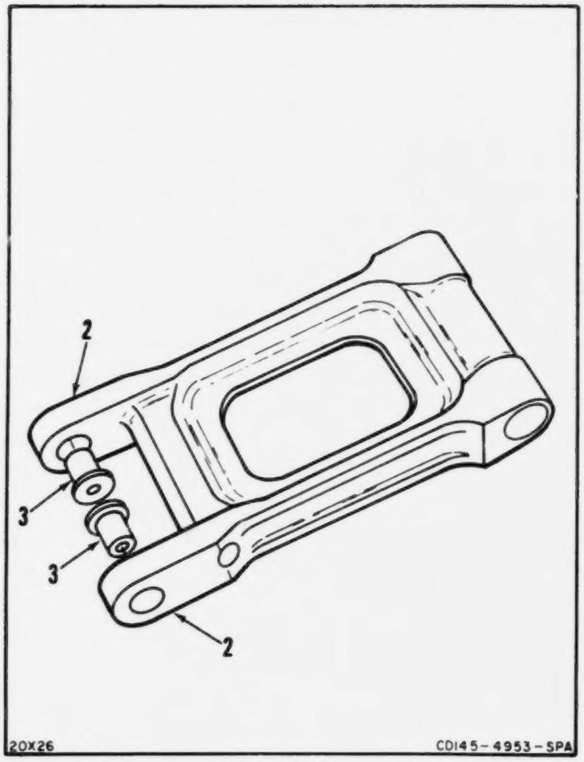
1. Clean bearing seat areas (1) of lugs (2). Use cloth (E120) damp with dry cleaning solvent (E162). Wear gloves (E186).



CAUTION

Do not apply primer to inside diameter or flange of bearings. Bearing coating will be damaged.

2. Apply epoxy primer (E293) to bore of lugs (2) and outside diameter of bearings (3).
3. **Press two bearings (3) into lugs (2).** Use arbor press and adapter (TM 55-1500-322-24).



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5-107 ASSEMBLE UPPER DRIVE ARM (AVIM) (Continued) 5-107

WARNING

Carbon dioxide (dry ice) (E92) in methanol (E243) is flammable, causes severe burns (frost bite), and gives off toxic fumes. Use only in well-ventilated area, away from heat and open flame. Do not get in eyes, on skin, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

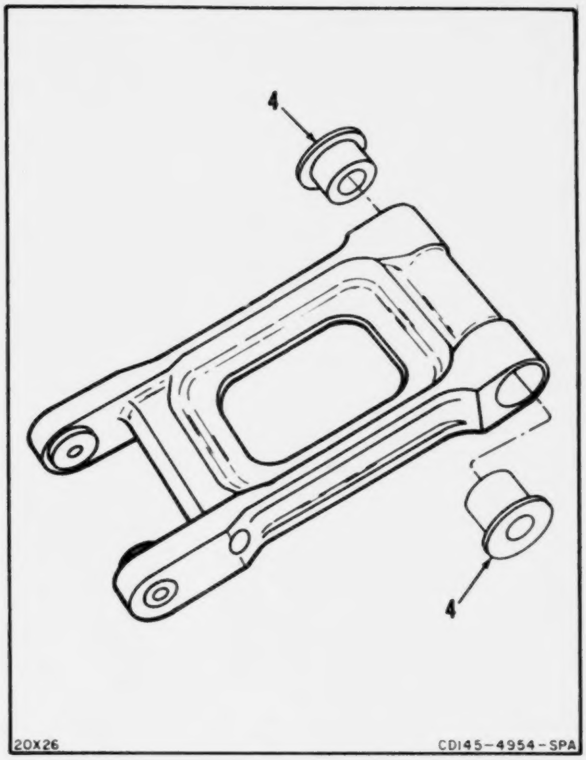
WARNING

Liquid nitrogen (E247) causes severe burns (frost bite). Do not get in eyes, on skin, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Wear gloves when handling chilled parts. Chilled parts can injure unprotected skin.

4. **Chill two bushings (4)** in mixture of dry ice (E92) and methanol (E243) or liquid nitrogen (E247).



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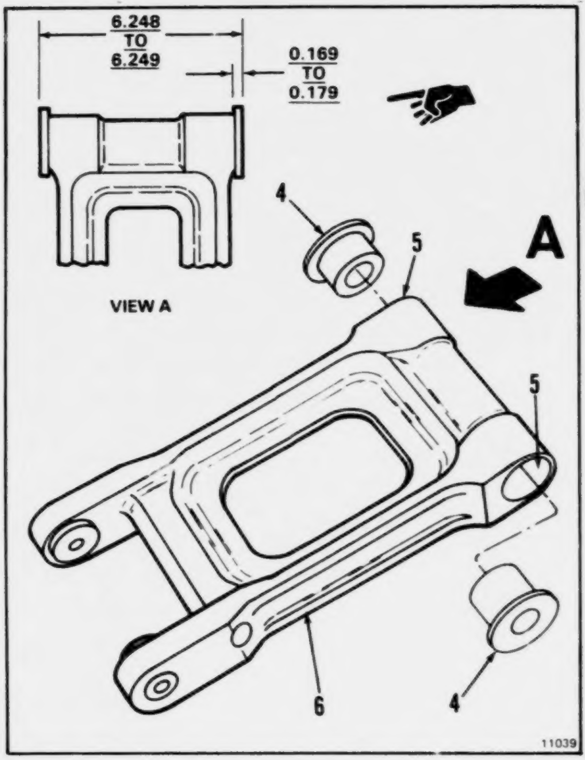
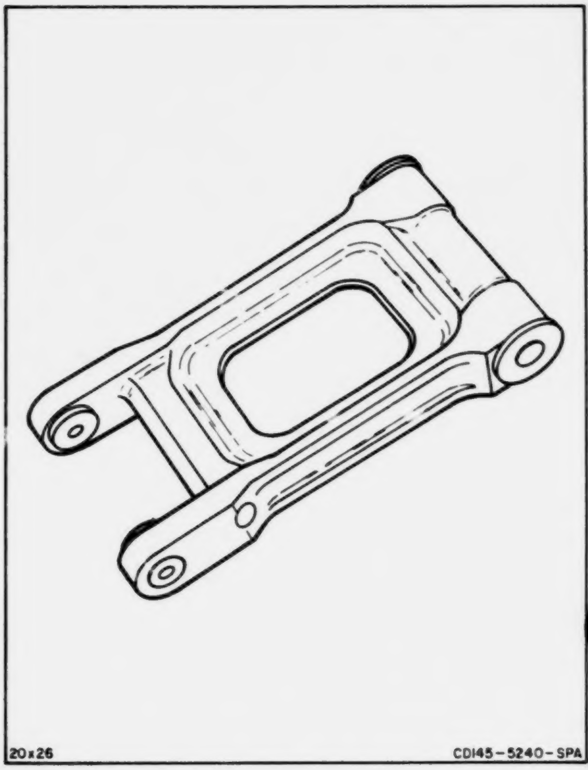
5. Clean bushing seat areas (5) of arm (6). Use cloth (E120) damp with dry cleaning solvent (E162). Use goggles for eyes.
6. Apply epoxy primer (E293) to bushing seat areas (5).
7. Wipe bushings (4) dry. Use cloth (E120).
8. **Press chilled bushings (4) into arm (6).** Use arbor press and adapter. Wear gloves (E187).
9. Check that flanges of bushings (4) are pressed against arm (6).
10. Machine flange of either bushing (4) to 0.169 to 0.179 inch.
11. Measure distance between flanges of bushings (4). Distance shall be 6.248 to 6.249 inch. If within limits, go to FOLLOW-ON MAINTENANCE. If not within limits, do step 12.
12. Machine flange of bushing (4) that was not machined in step 10, until distance between flanges is 6.248 to 6.249 inch.



INSPECT

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-108 DISASSEMBLE LOWER DRIVE ARM (AVIM) 5-108

INITIAL SETUP

Applicable Configurations:

All

Tools:

Portable Electric Drill
Twist Drill Set
Arbor Press
Adapter (Appx E-10)
Machinist's Vise
Vise Jaw Caps
Slide Hammer
Electric Heat Gun

Materials:

Temperature Indicating Strips (E413)

Personnel Required:

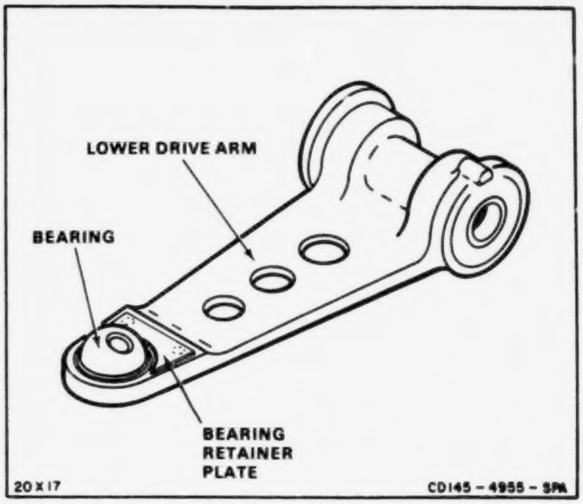
Aircraft Powertrain Repairer (2)

References:

Appendix E
TM 55-1500-322-24

Equipment Condition:

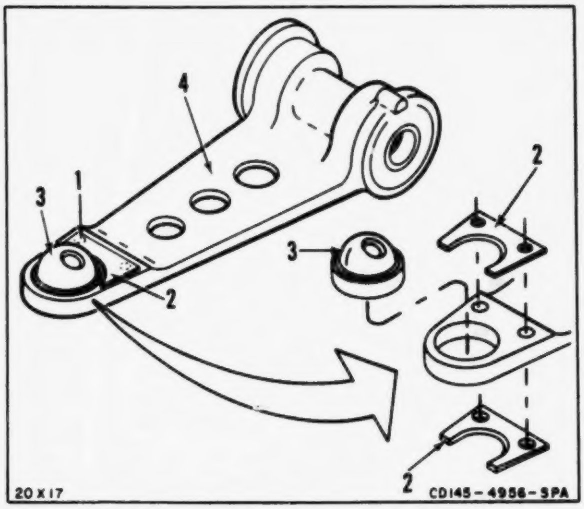
Off Helicopter Task


LOWER DRIVE ARM
BEARING
BEARING RETAINER PLATE
20 X 17
CD145 - 4955 - SPA

NOTE

Procedure is same to disassemble forward or aft lower drive arm.

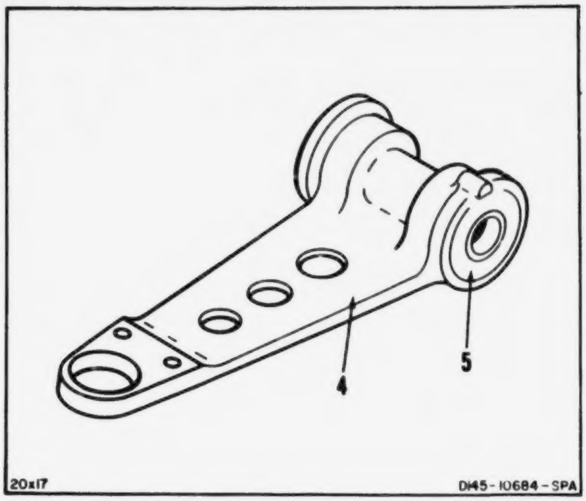
1. Drill out two rivets (1). **Remove two plates (2).**
2. **Press bearing (3) from arm (4).** Use arbor press and adapter (Appx E-10) (TM 55-1500-322-24).


4
1
3
2
3
2
2
20 X 17
CD145 - 4956 - SPA

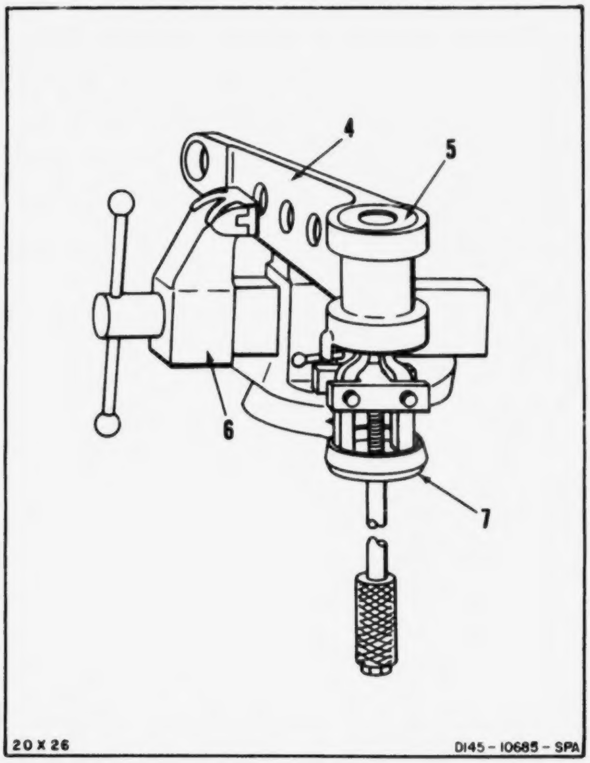
GO TO NEXT PAGE

5-108 DISASSEMBLE LOWER DRIVE ARM (AVIM) (Continued) 5-108

3. **Heat arm (4) to 225°F (107°C)** around bushings (5). Use electric heat gun. Monitor temperature. Use temperature indicating strips (E413).


4
5
20x17
DI45-10684-SPA

4. **Install arm (4) in machinist's vise (6).**
5. Position slide hammer (7) in bushing (5). **Remove bushing.**
6. Repeat steps 4 and 5 for other bushing (5).
7. Remove drive arm (4) from vise (6).


4
5
6
7
20 X 26
DI45-10685-SPA

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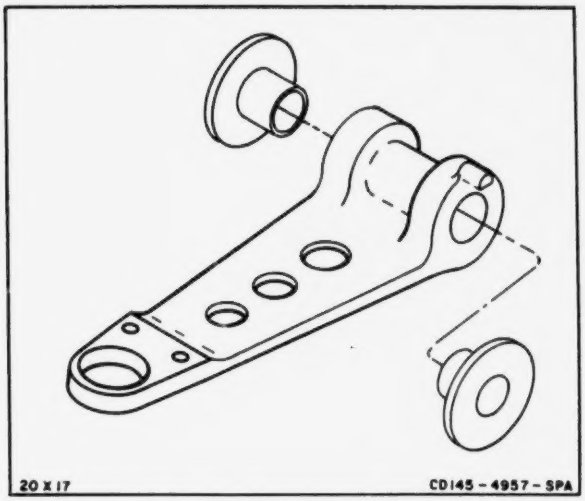
5-108 DISASSEMBLE LOWER DRIVE ARM (AVIM) (Continued) 5-108

FOLLOW-ON MAINTENANCE:

None


20 X 17
CD145 - 4957 - SPA

END OF TASK

5-109 INSPECT LOWER DRIVE ARM (AVIM) 5-109

INITIAL SETUP

Applicable Configurations:

All

Tools:

Technical Inspection Tool Kit, NSN 5180-00-323-5114
Bench Vise
Arbor Press
Adapter (Appx E-10)
Portable Electric Drill
Goggles
Vernier Caliper, 3-Inch

Materials:

Dry Cleaning Solvent (E162)
Cloth (E120)
Gloves (E186)

Personnel Required:

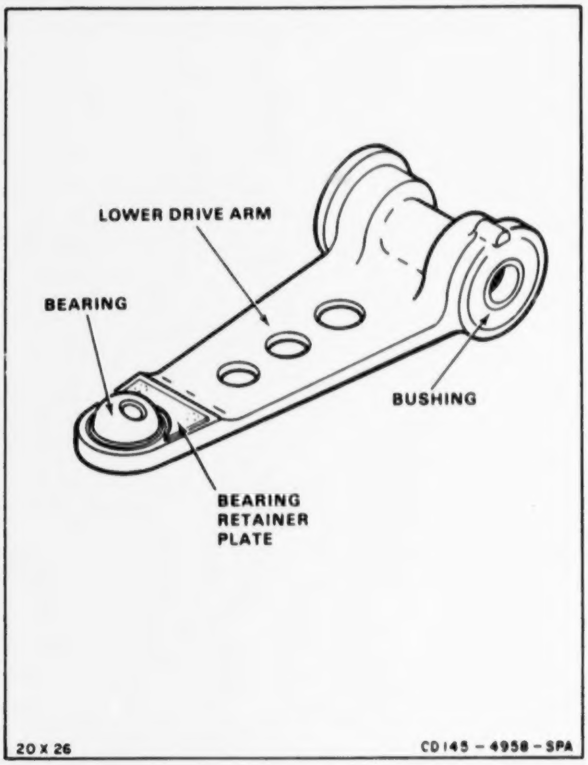
Aircraft Powertrain Repairer
Inspector

References:

Appendix E

Equipment Condition:

Off Helicopter Task



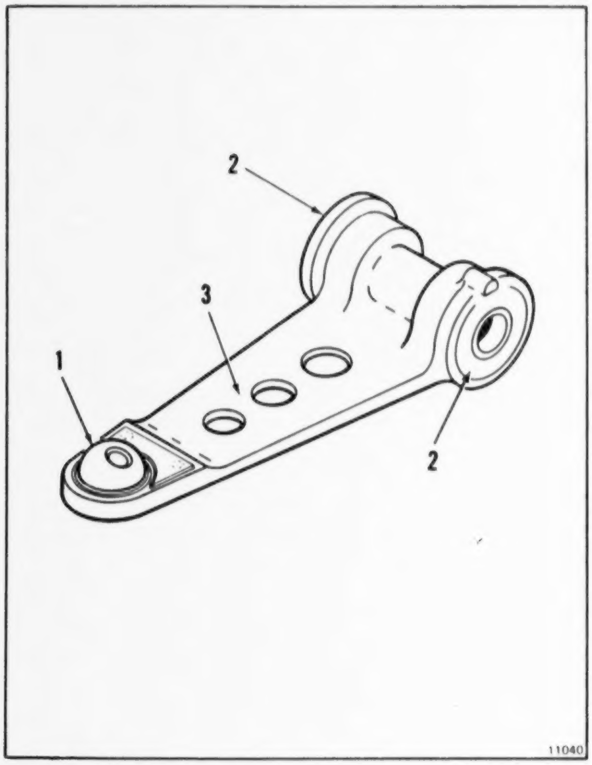
NOTE

Procedure is same to inspect forward or aft upper drive arm. Inspection of lower drive arm is shown here.

1. **Check Teflon coating on bearing (1).** Coating shall not be torn, scored or frayed.
2. **Check two shoulder bushings (2) in lower drive arm (3).** Bushings shall not be loose.
3. **Measure inside diameter of bearing (1).** Diameter shall not exceed 0.3755 inch.

3.1. **Measure inside diameter of bushings (2).** Diameter shall not exceed 0.5647 inch.

4. **Check all surfaces of drive arm (3)** for scratches, pits, or other damage. Damage not exceeding 0.005 inch deep shall be accepted without rework. Damage between 0.005 inch and 0.040 inch deep shall be blend repaired. Depth of blend repair shall not exceed 0.040 inch or 10 percent of material thickness, whichever is less. Blend radius must be at least 1 inch.



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5-109 INSPECT LOWER DRIVE ARM (AVIM) (Continued) 5-109

5. **Check axial and radial play in lower drive arm bearing (3)** as follows:

   a. Install bolt (4), eight washers (5), and nut (6) in bearing (3).

   b. Clamp bolt (4) in bench vise (7).

   c. Clamp dial indicator (8) on lower drive arm (2). Position contact point (9) against vise (7).

   d. Try to move arm (2) in horizontal direction. Check dial indicator (8) for movement. Movement shall not exceed 0.006 inch. Make sure bolt (4) does not move in vise (7).

   e. Try to move arm (2) in vertical direction. Use feeler gage between arm and jaws of vise (7) to measure movement. Movement shall not exceed 0.003 inch.

   NOTE

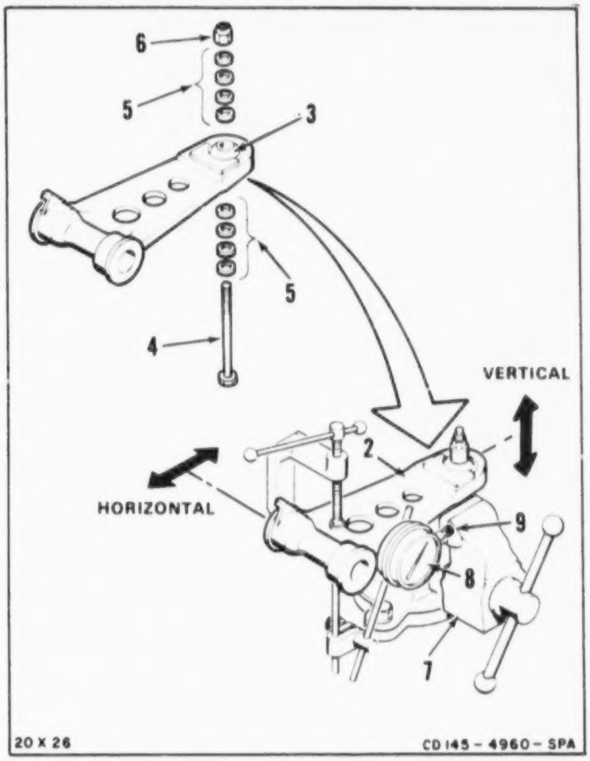
   After performing steps f and g, proceed with steps 4 thru 7 only if movement exceeds 0.003 inch.

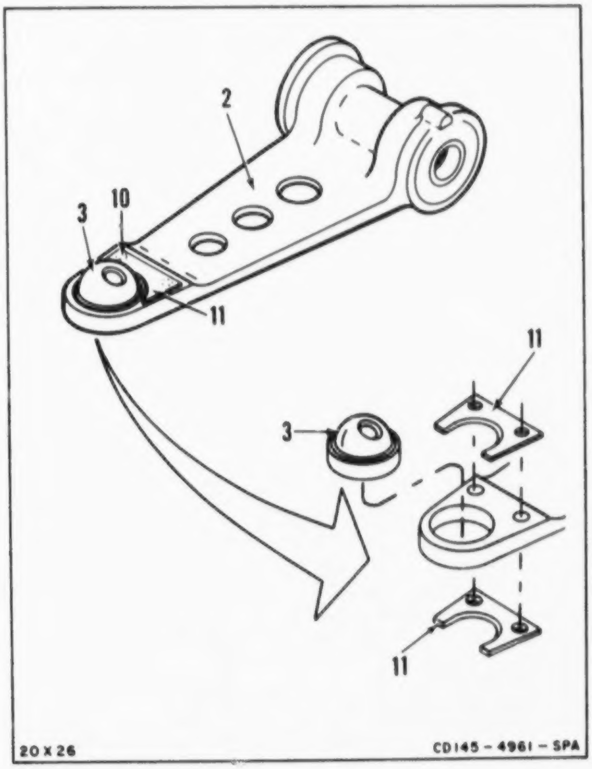
   f. Remove arm (2) and bolt (4) from vise (7).

   g. Remove bolt (4), washers (5), and nut (6) from arm (2).

6. Drill out two rivets (10). **Remove two plates (11).**

7. **Press bearing (3) from arm (2).** Use arbor press and adapter.





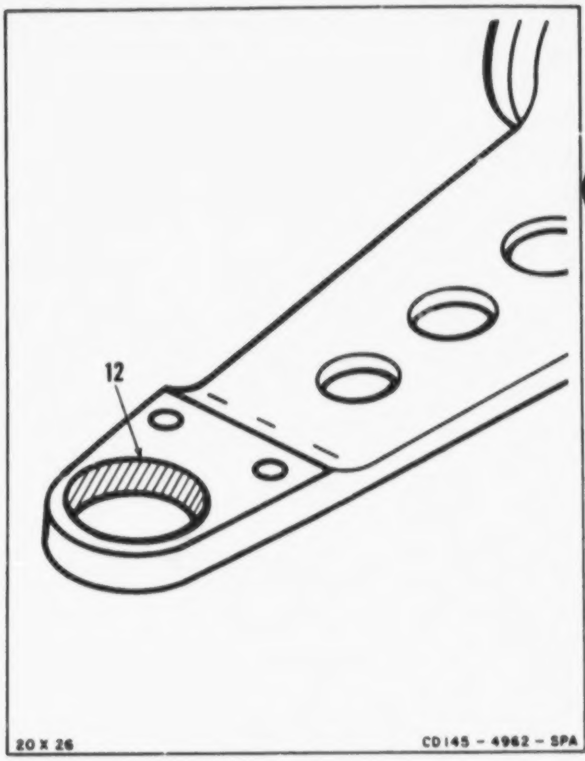
GO TO NEXT PAGE

5-109 INSPECT LOWER DRIVE ARM (AVIM) (Continued) 5-109

WARNING

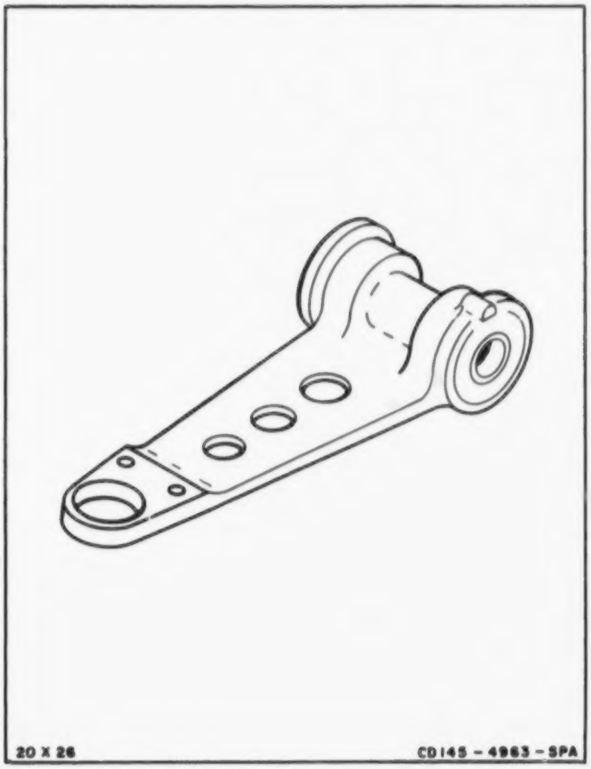
Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

8. Clean bearing seat area (12). Use cloth (E120) damp with solvent (E162). Use goggles for eyes. Wear gloves (E186).
9. **Check bearing seat area (12).** There shall be no cracks, scratches, dents, gouges, or scuffs.



FOLLOW-ON MAINTENANCE:

If bearing was removed, install bearing (Task 5-110).



END OF TASK

5-110 ASSEMBLE LOWER DRIVE ARM (AVIM) 5-110

INITIAL SETUP

Applicable Configurations:
All

Tools:
- Technical Inspection Tool Kit, NSN 5180-00-323-5114
- Kevlar Gloves (E187)
- Arbor Press
- Adapter (Appx E-10)
- Two Quart Container

Materials:
- Dry Cleaning Solvent (E162)
- Cloth (E120)
- Zinc Chromate Primer (E291)
- Epoxy Primer (E293)
- Gloves (E186)
- Dry Ice (E92)
- Methanol (E243)
- Liquid Nitrogen (E247) (Alternate Coolant)

Parts:
Rivets

Personnel Required:
- Aircraft Powertrain Repairer (2)
- Inspector

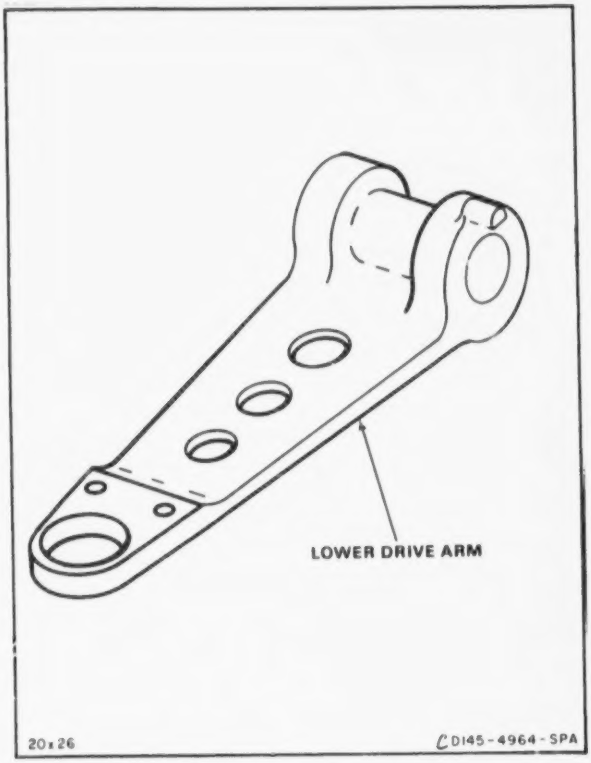
References:
- TM 55-1520-240-23P
- TM 55-1500-322-24
- Appendix E

Equipment Condition:
Off Helicopter Task

General Safety Instructions:

WARNING

Zinc chromate primer (E291), epoxy primer (E293), and dry cleaning solvent (E162) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



WARNING

Carbon dioxide (dry ice) (E92) in methanol (E243) is flammable, causes severe burns (frost bite), and gives off toxic fumes. Use only in well-ventilated area, away from heat and open flame. Do not get in eyes, on skin, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Liquid nitrogen (E247) causes severe burns (frost bite). Do not get in eyes, on skin, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Wear kevlar gloves when handling chilled parts. Chilled parts can injure unprotected skin.

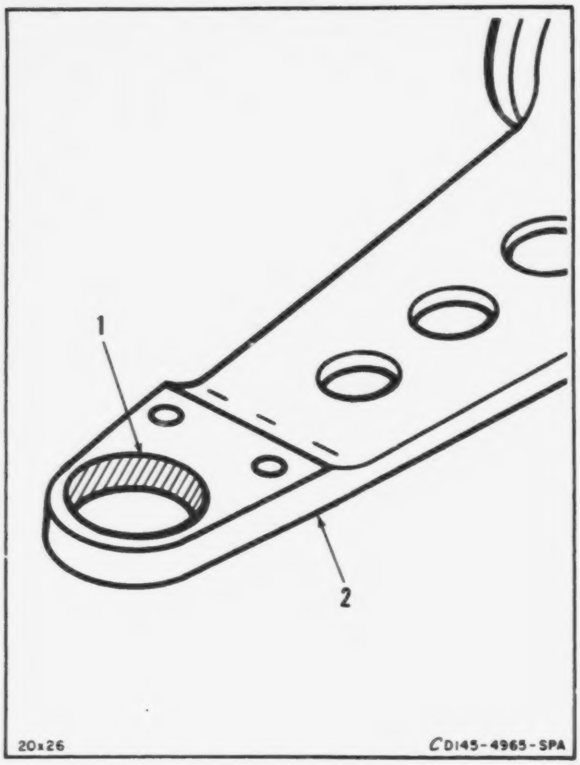
GO TO NEXT PAGE

5-110 ASSEMBLE LOWER DRIVE ARM (AVIM) (Continued) 5-110

NOTE

Procedure is same to assemble forward or aft lower drive arm.

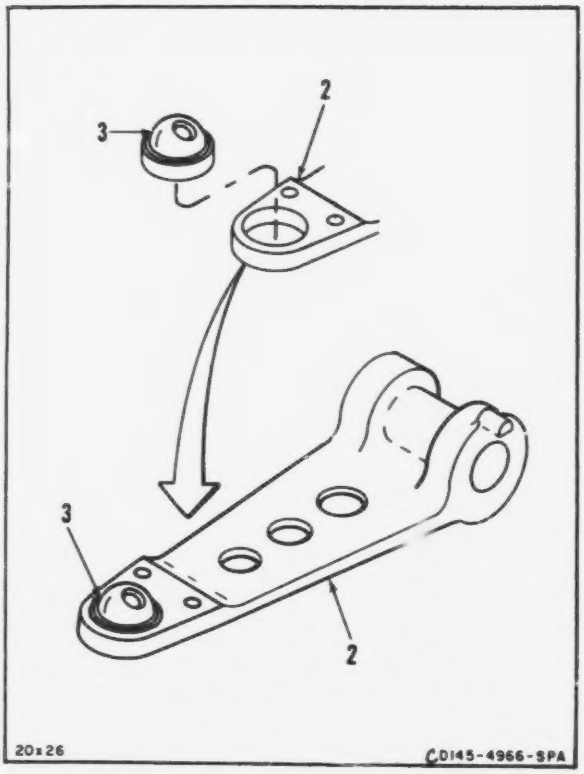
1. Apply epoxy primer (E293) to bearing seat area (1) of lower drive arm (2). Wear gloves (E186).



NOTE

Bearing must be installed while epoxy primer is wet.

2. **Chill bearing (3)** in mixture of dry ice (E92) and methanol (E243). Wear goggles for eyes. Wear gloves (E187).
3. Wipe bearing (3) dry. Use cloth (E120).
4. **Install chilled bearing (3) in lower arm (2).** Use arbor press and adapter. Make sure bearing is aligned (TM 55-1500-322-24). Wear gloves (E187).
5. Wipe excess epoxy primer (E293) from bearing (3). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).



GO TO NEXT PAGE

5-110 ASSEMBLE LOWER DRIVE ARM (AVIM) (Continued) 5-110

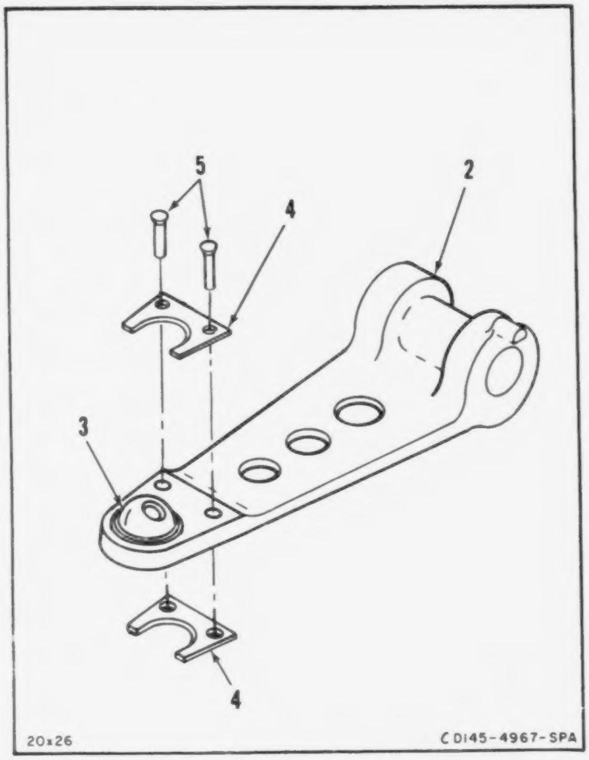
6. Wait until bearing (3) warms to room temperature.
7. Apply zinc chromate primer (E291) to faying surfaces of two retainer plates (4). Wear gloves (E186).

NOTE

Holes in plates and arm may be enlarged for 5/32-inch oversized rivets.

8. **Position two plates (4)** on lower arm (3).
9. Apply zinc chromate primer (E291) to two rivets (5). **Install two rivets** in two plates and arm, while rivets are wet. Wear gloves (E186).

INSPECT



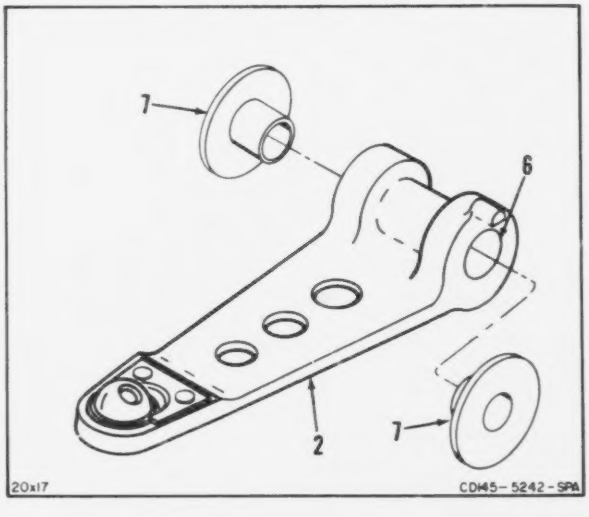
10. Apply epoxy primer (E293) to bushing seat area (6) of arm (2). Wear gloves (E186).

NOTE

Bearing must be installed while epoxy primer is wet.

11. **Chill bushings (7)** in mixture of dry ice (E92) and methanol (E243). Wear goggles for eyes. Wear gloves (E187).
12. Wipe bushings (7) dry. Use cloth (E120).
13. **Install chilled bushings (7) in lower arm (2).** Use arbor press and adapter. Make sure bushings are aligned (TM 55-1500-322-24). Wear gloves (E187).
14. Wipe excess epoxy primer from bushings (7). Use cloth (E120) damp with solvent (E162). Wear gloves (E186).

INSPECT



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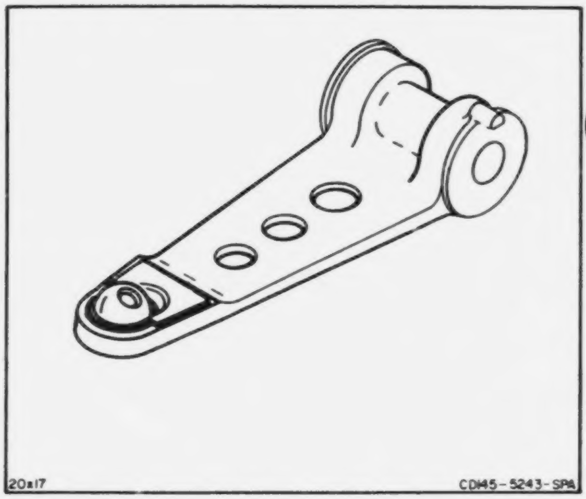
FOLLOW-ON MAINTENANCE:

None


20x17
CD145-5243-SPA

END OF TASK

5-111 INSTALL DRIVE COLLAR 5-111

INITIAL SETUP

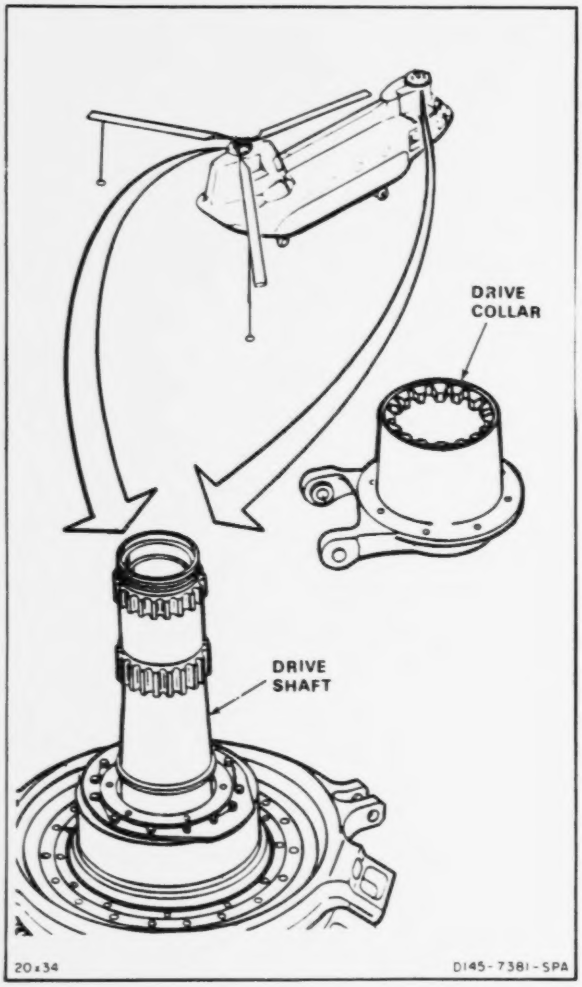
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Torque Wrench, 100 to 750 Inch-Pounds
Torque Wrench, 30 to 150 Inch-Pounds

Materials:
Grease (E190)
Twine (E433)
Cloth (E120)
Toluene (E423)
Sealant (E336)
Gloves (E186)

Personnel Required:
67U10 Medium Helicopter Repairer (2)
67U30 Inspector

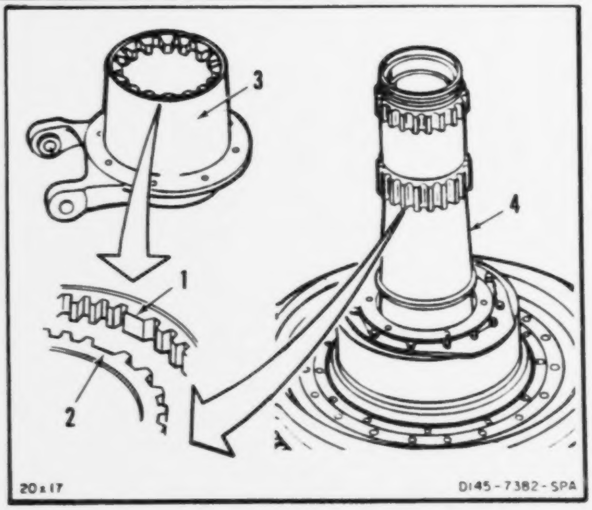
References:
TM 55-1520-240-23P



NOTE

Procedure is similar to install forward or aft drive collar. Differences are noted in text.

1. Align master splines (1 and 2) of drive collar (3) and drive shaft (4). **Slide collar onto shaft.**



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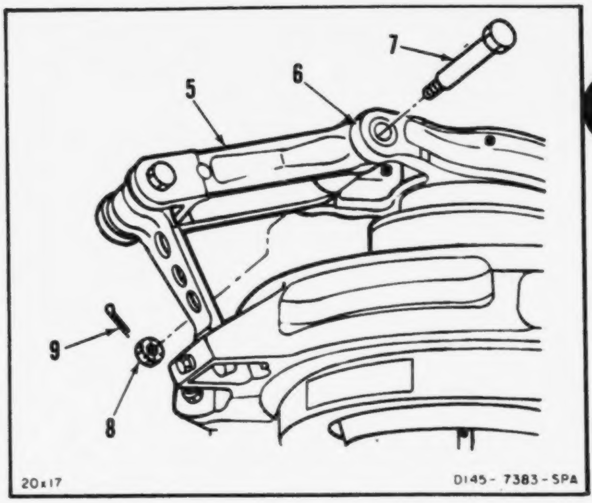
5-111 INSTALL DRIVE COLLAR (Continued) 5-111

2. Position upper drive arm (5) in lugs (6). **Install bolt (7)** and nut (8). **Torque nut to 500 to 700 inch-pounds.** Install cotter pin (9).

NOTE

Forward head is shown here. Bolt heads are positioned in direction of rotation. Bolts are reversed on aft head.


7
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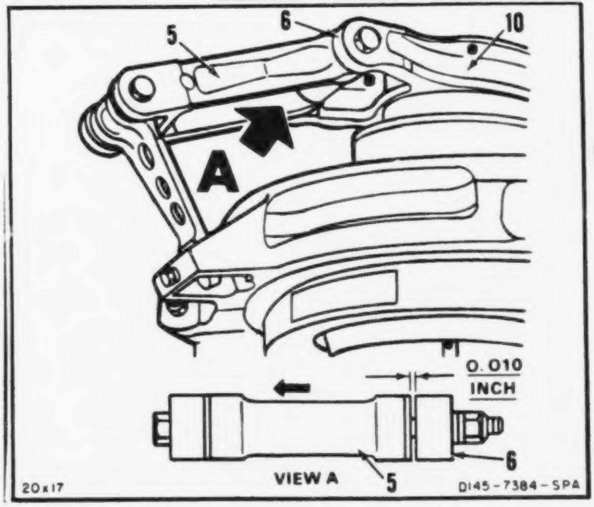
20x17
D145-7383-SPA

3. **Slide upper drive arm (5) all the way to one side. Measure clearance between arm and drive collar lug (6) of drive collar (10).** Clearance shall not exceed 0.010 inch.


5
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0.010 INCH
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5
20x17
D145-7384-SPA

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5-111 INSTALL DRIVE COLLAR (Continued) 5-111

WARNING

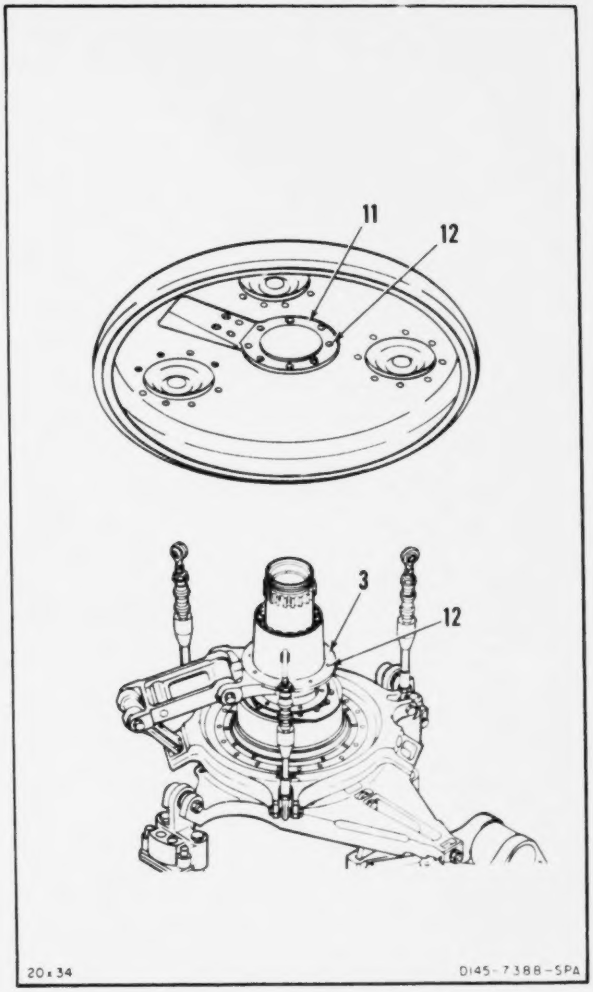
Toluene (E423) can form toxic vapors if exposed to flame. Use in well-ventilated area, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

4. Clean mating surfaces of drive collar (3) and weather-protective cover (11). Use cloth (E120) damp with toluene (E423). Wear gloves (E186).

NOTE

Holes are not equally spaced.

5. Align holes (12) in drive collar (3) and cover (11).

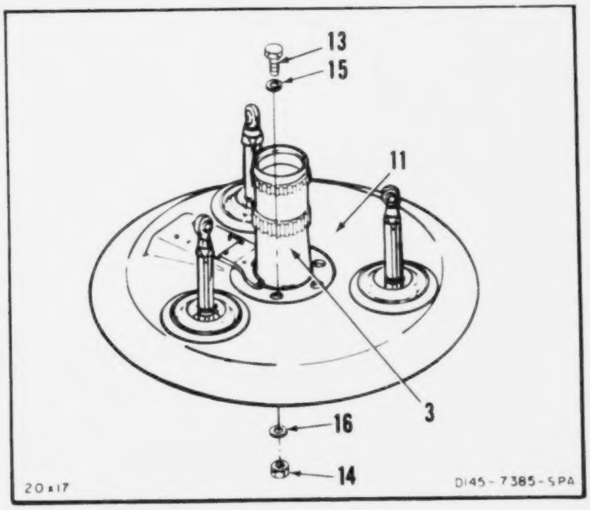


6. **Install 8 bolts (13),** 8 nuts (14), and 24 washers (15 and 16). Install bolts heads up with one washer (15) under head. **Torque nuts to 60 inch-pounds above friction torque.**

WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, and clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

7. Apply sealant (E336) at junction of drive collar (3) and cover (11). Wear gloves (E186).



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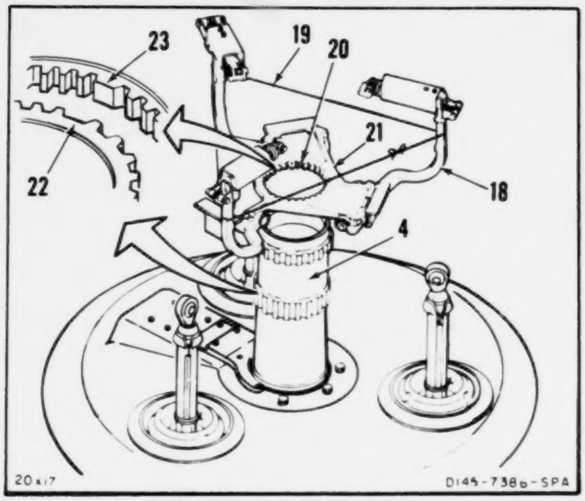
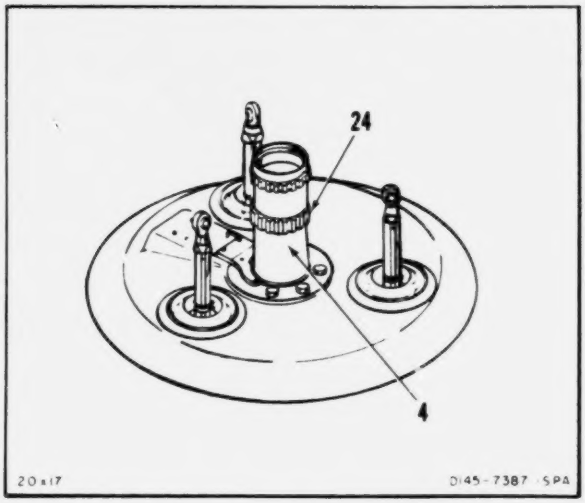
NOTE

If installing aft drive collar, do steps 8 thru 10. If installing forward drive collar, go to step 11.

8. For aft drive shaft (4) only, tie three balancing arms (18) together. Use twine (E433) (19).
9. Apply grease (E190) to splines (20) of centrifugal droop stops (21). Wipe excess grease from top and bottom of plate.
10. Align master splines (22 and 23) of drive shaft (4) and centrifugal droop stop (21). **Install droop stop.**



11. For forward drive shaft (4) only, **install spacer (24)** on shaft.



INSPECT

FOLLOW-ON MAINTENANCE:

Connect pitch link upper end (Task 5-99).

Install rotary-wing head (Task 5-9).

Install rotary-wing blades (Task 5-84).

Close forward or pylon work platforms (Task 2-2).

END OF TASK

5-112 INSTALL DRIVE ARMS 5-112

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Torque Wrench, 30 to 150 Inch-Pounds

Torque Wrench, 100 to 750 Inch-Pounds

Gage Depth, Dial Indicating 0 to 0.125 Inch

Materials:

Lockwire (E231)

Antiseize Compound (E75)

Gloves (E186)

Parts:

Cotter Pins

Personnel Required:

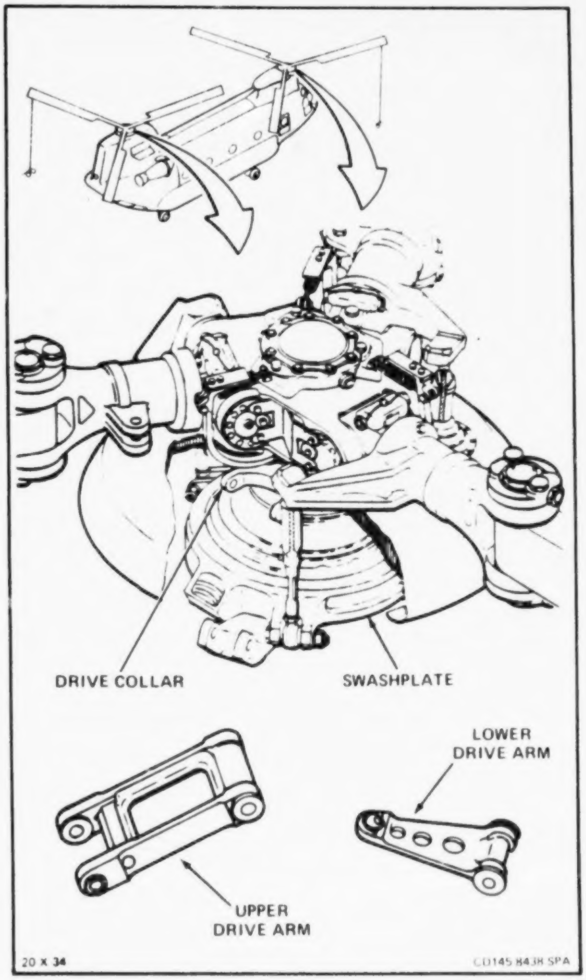
Medium Helicopter Repairer

Inspector

References:

TM 55-1520-240-23P

TM 55-1500-204-25/1


DRIVE COLLAR
SWASHPLATE
LOWER DRIVE ARM
UPPER DRIVE ARM
20 X 34
CD145 8438 SPA

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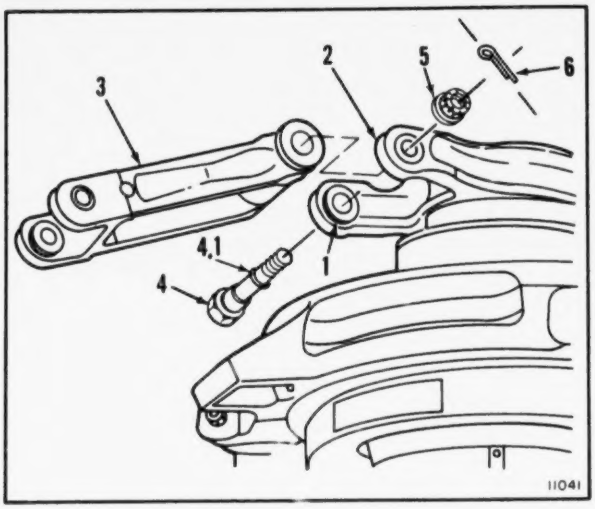


CAUTION

Impedance bolts are installed in all three drive arm joints. These bolts have a special torque (Task 1-14).

NOTE

Procedure is same to install forward or aft drive arms.

1. **Check that flanged sleeve bushings (1) are installed** in drive collar lugs (2).

NOTE

- Aft installation shown. Bolt on forward installation is installed with head in opposite direction.
- Do not lubricate thread or sleeve of bolt.

2. **Position upper drive arm (3)** in lugs (2). Apply antiseize compound (E75) only to grip portion of bolt (4). Wear gloves (E186). **Install bolt.**

2.1. Check retaining ring (4.1) is clear of sleeve bushing (1) and turns freely. Install nut (5). Torque nut to 500 to 700 inch-pounds.

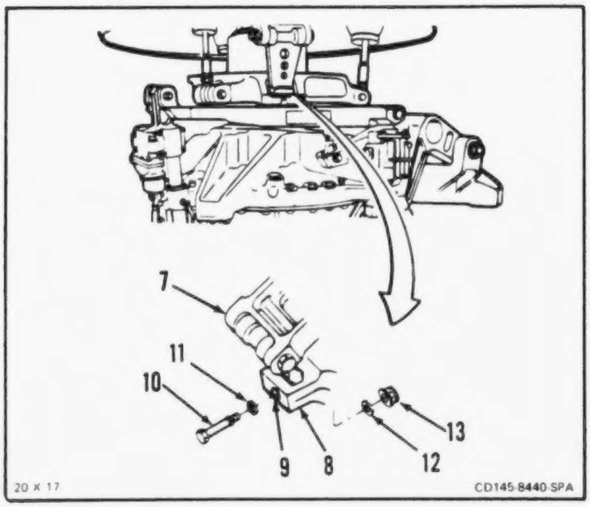
2.2. Install cotter pin (6).

2.3. Apply 165 inch-pounds torque to head of bolt (4). Bolt shall not turn.

NOTE

At forward swashplate, make sure lower drive arm is installed in lug marked FWD. At aft swashplate, make sure lower drive arm is installed in lug marked AFT. Installation at forward swashplate is shown here.

3. **Position lower drive arm (7)** in correct swashplate drive arm lug (8).
4. **Check that bushing (9) is installed.**
5. **Install bolt (10), thin washer (11), washer (12), and nut (13). Torque bolt to 190 to 270 inch-pounds** as needed for cotter pin hole alignment.



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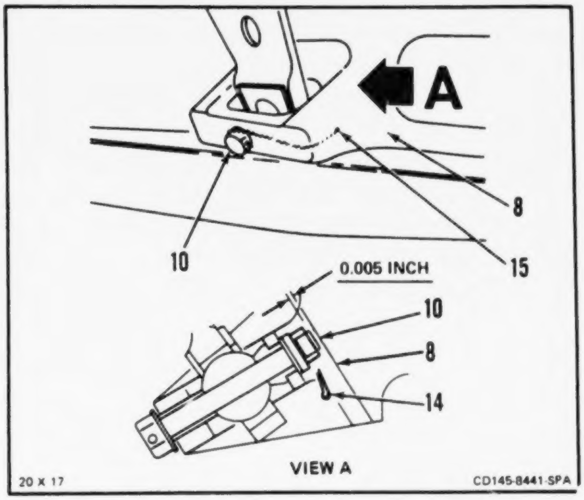
5-112 INSTALL DRIVE ARMS (Continued) 5-112

6. **Check clearance between end of bolt (10) and inside of lug (8).** Clearance shall be at least 0.005 inch. Add washer under bolt head if needed.
7. Install cotter pin (14). Lockwire bolt (10) to hole (15) in lug (8). Use lockwire (E231).

INSPECT



8. **Check that sleeve bushings (16) are in place** in upper drive arm lugs (17).
9. **Position lower drive arm (7)** between upper drive arm lugs (17).

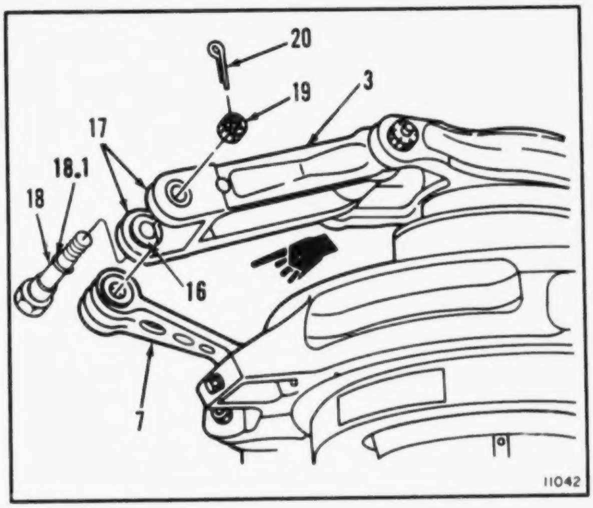
NOTE

Do not lubricate thread or sleeve bushing of bolt.

10. Apply antiseize compound to grip of bolt (13) only. Wear gloves (E186). **Install bolt (18).**

10.1. Check retaining ring (18.1) is clear of sleeve bushing (16) and turns freely. Install nut (19). Torque nut to 500 to 700 inch-pounds.

11. Install cotter pin (20).
12. Apply 165 inch-pounds torque to head of bolt (18). Bolt shall not turn.



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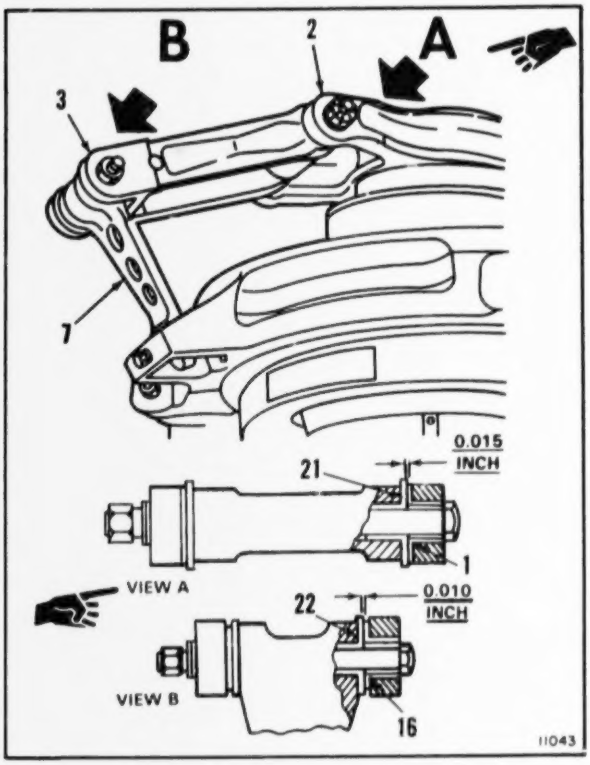
13. **Check clearance between upper drive arm (3) and drive collar lugs (2)** as follows:
    a. Press drive arm (3) all the way to one side.
    b. Measure distance between drive arm bushing (21) and drive collar lug bushing (1). Distance shall not be greater than 0.015 inch.
14. Check clearance between upper drive arm (3) and lower drive arm (7) as follows:
    a. Press drive arm (3) all the way to one side.
    b. Measure distance between upper drive arm bushing (17) and lower drive arm bushing (22). Distance shall not be greater than 0.010 inch.

INSPECT



FOLLOW-ON MAINTENANCE:

Connect pitch link upper end (Task 5-99).
Close work platforms (Task 2-2).

END OF TASK

5-113 CLEAN INSTALLED SWASHPLATE 5-113

INITIAL SETUP

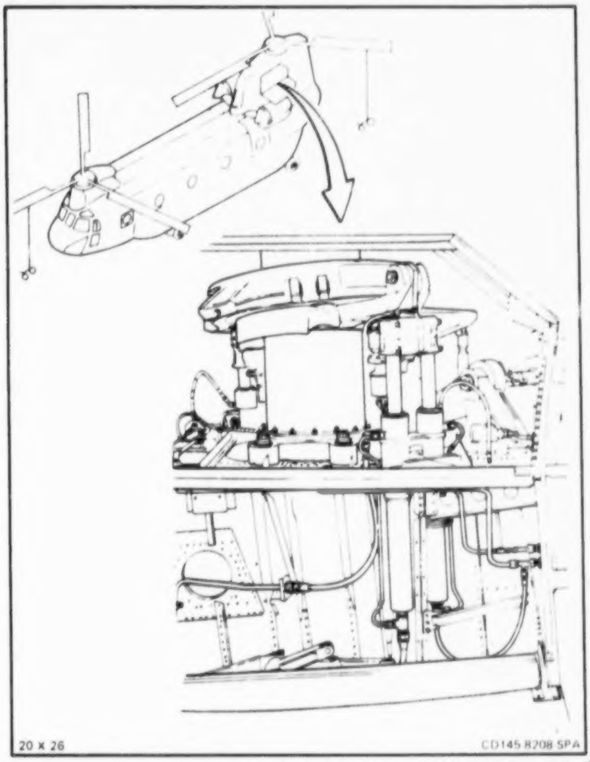
Applicable Configurations:
All

Tools:
None

Materials:
Cloth (E120)
Dry Cleaning Solvent (E162)
Gloves (E186)

Personnel Required:
67U10 Medium Helicopter Repairer

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied Down (Task 1-26)
Work Platform Open As Required (Task 2-2)



WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

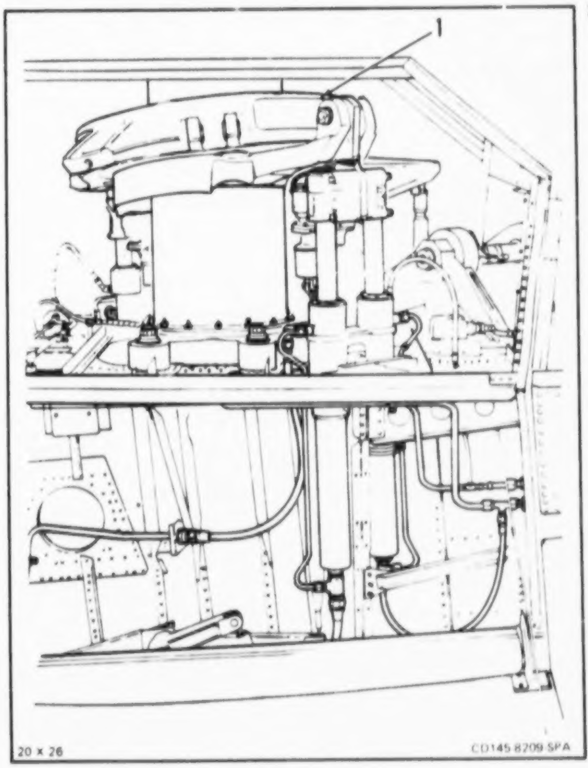
CAUTION

Do not use excessive solvent (E162). Too much solvent can wash foreign material into bearing and seal area.

NOTE

Procedure is same to clean forward or aft swashplate. Aft swashplate is shown in task.

1. **Clean swashplate (1).** Use cloth (E120) damp with solvent (E162). Wear gloves (E186).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-114 BALL SPHERICAL BEARING FRICTION CHECK 5-114

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Technical Inspection Tool Kit, NSN 5180-00-323-5114
Dial Indicating Scale, 0 to 100 Pounds
Torque Wrench, 100 to 750 Inch-Pounds
Wood Blocks (2), 5 x 2 x 3/4 Inches
Web Strap

Materials:
Twine (E433)

Parts:
Cotter Pins

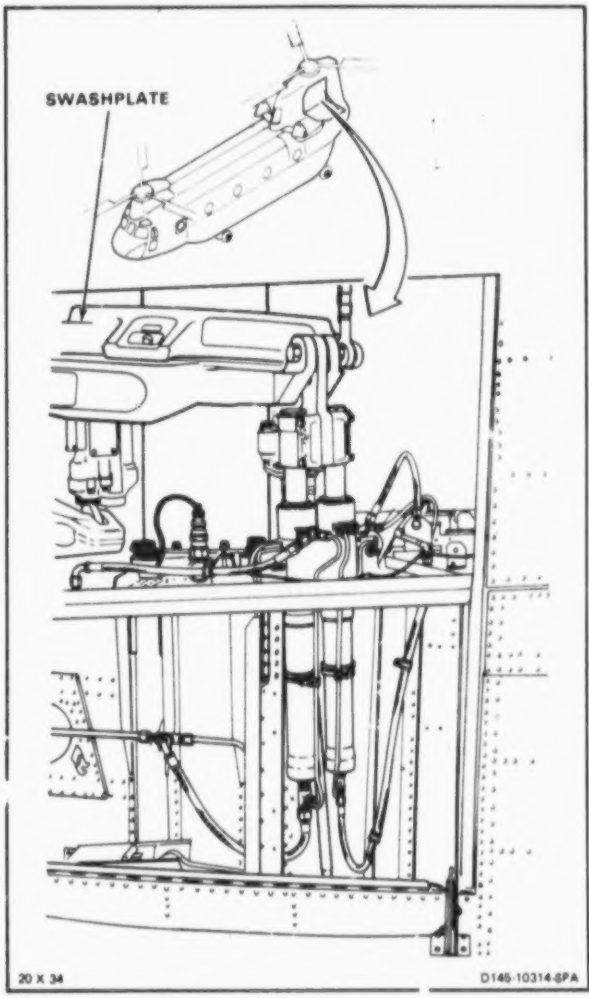
Personnel Required:
67U20 Medium Helicopter Repairer (2)
67U30 Inspector

References:
Task 5-97
Task 5-99
Task 5-115
Task 5-116
Task 5-132
Task 5-133

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied-Down (Task 1-26)
Work Platform Open (Task 2-2)
Safety Blocks Removed (Task 11-29)

NOTE

- Ball spherical friction check may be performed off helicopter with swashplate temporarily installed on slider shaft.
- Spherical bearing friction check is same for forward and aft swashplates. Aft swashplate is shown here.



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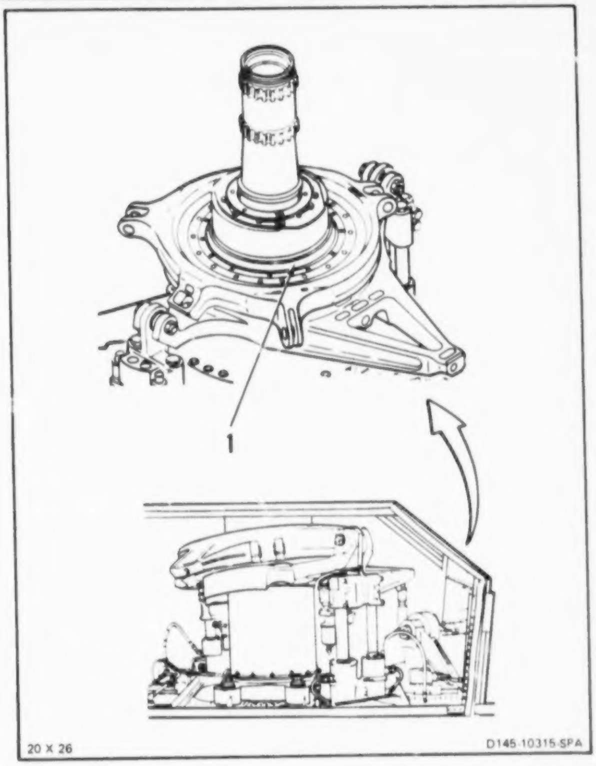
5-114 BALL SPHERICAL BEARING FRICTION CHECK (Continued) 5-114

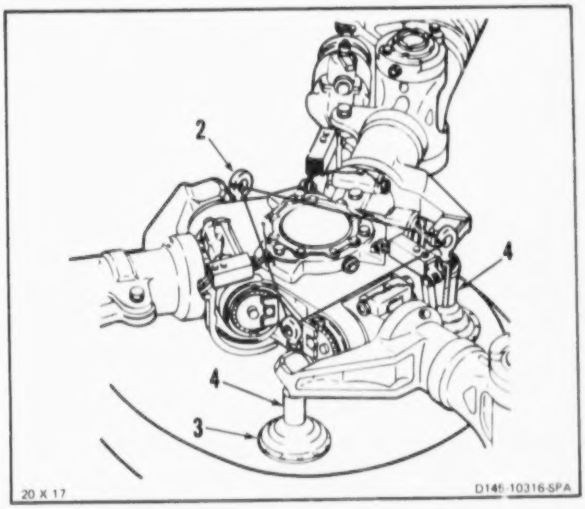
NOTE

Rotary-wing head removed for clarity.

1. **Check ball spherical bearing (1).** There shall be no surface defects. Teflon liner shall not be frayed more than 0.10 inch in from edge.



2. **Disconnect three pitch links (2).** Have helper guide pitch links. Do not remove pitch link boots (3) (Task 5-97).
3. Pull pitch links (2) up as far as they will go without damage to boots (3) and covers (4). Tie links together. Use twine (E433).



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4. **Apply electrical power** to helicopter.

CAUTION

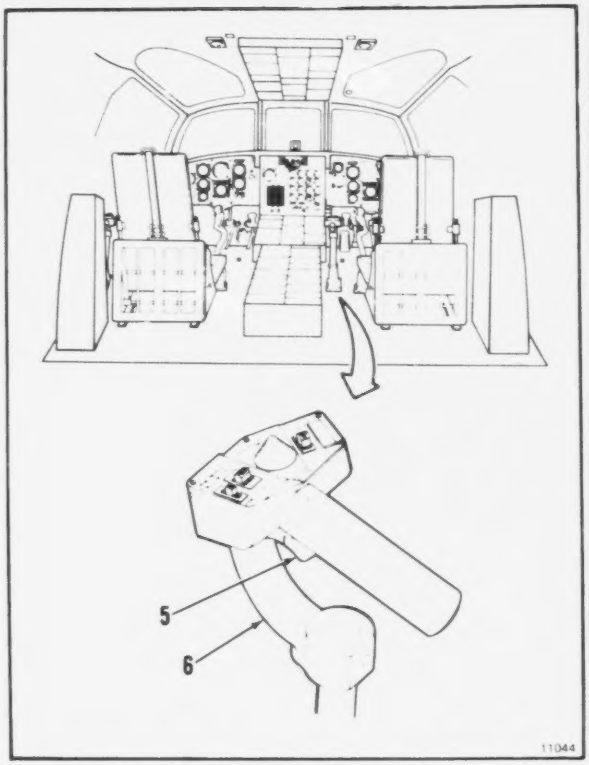
Have helper guide pitch links. Components can be damaged if forced together under pressure.

5. **Apply hydraulic power** to flight control system.

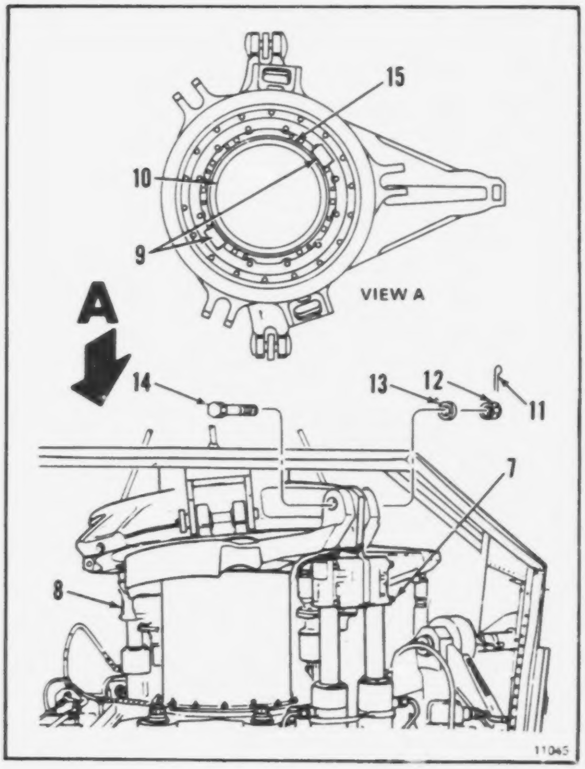
CAUTION

Do not move thrust control quickly. Thrust control must be raised very slowly when pitch links are disconnected, or controls can be damaged.

6. Press THRUST CONT BRAKE TRIGGER switch (5). Raise thrust control (6) slowly to full up position. Release switch.



7. Position two support blocks (9) on slider shaft (10). Secure blocks. Use web strap.
8. **Remove** cotter pin (11), nut (12), washer (13), and **bolt (14) from** upper end of **two actuating cylinders (7 and 8).**



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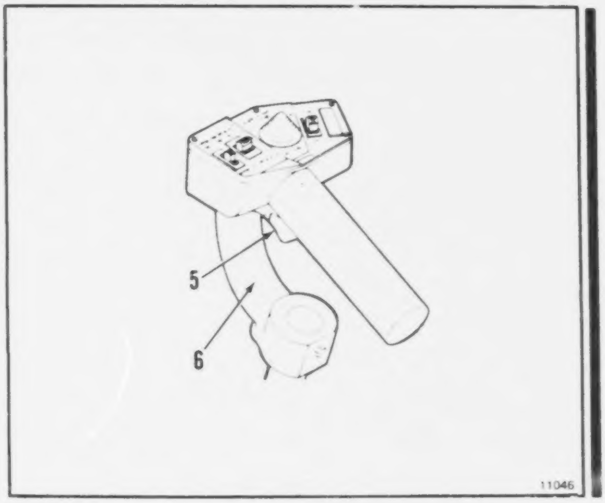
5-114 BALL SPHERICAL BEARING FRICTION CHECK (Continued) 5-114

NOTE

Moving thrust control down lowers actuating cylinders to simplify friction check.

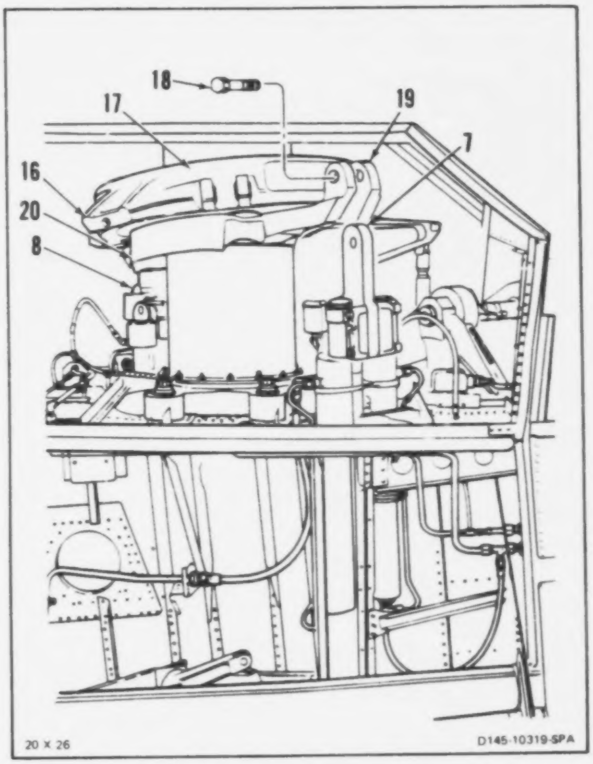
9. Press THRUST CONT BRAKE TRIGGER switch (5). **Move thrust control (6)** slowly to **full down** position. Release switch.
10. **Remove hydraulic and electrical power** from helicopter.



WARNING

Do not apply hydraulic boost pressure to move actuating cylinders when personnel are making swashplate friction check. Injury to personnel can result.

11. Move swashplate (16) so rotating ring (17) is clear of actuating cylinders (7 and 8).
12. Install two bolts (18) through actuating cylinder lugs (19) on stationary ring (20).
13. **Lift lugs (19) all the way up.** Use bolt (18).



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5-114 BALL SPHERICAL BEARING FRICTION CHECK (Continued) 5-114

14. **Attach dial indicating scale (21)** to bolt (18).

15. **Pull scale (21) down** in curved motion following path of swashplate (16) as it tilts. **Read scale** after ring begins to move. Force needed to keep swashplate moving shall be between 1.25 and 63.5 pounds.

NOTE

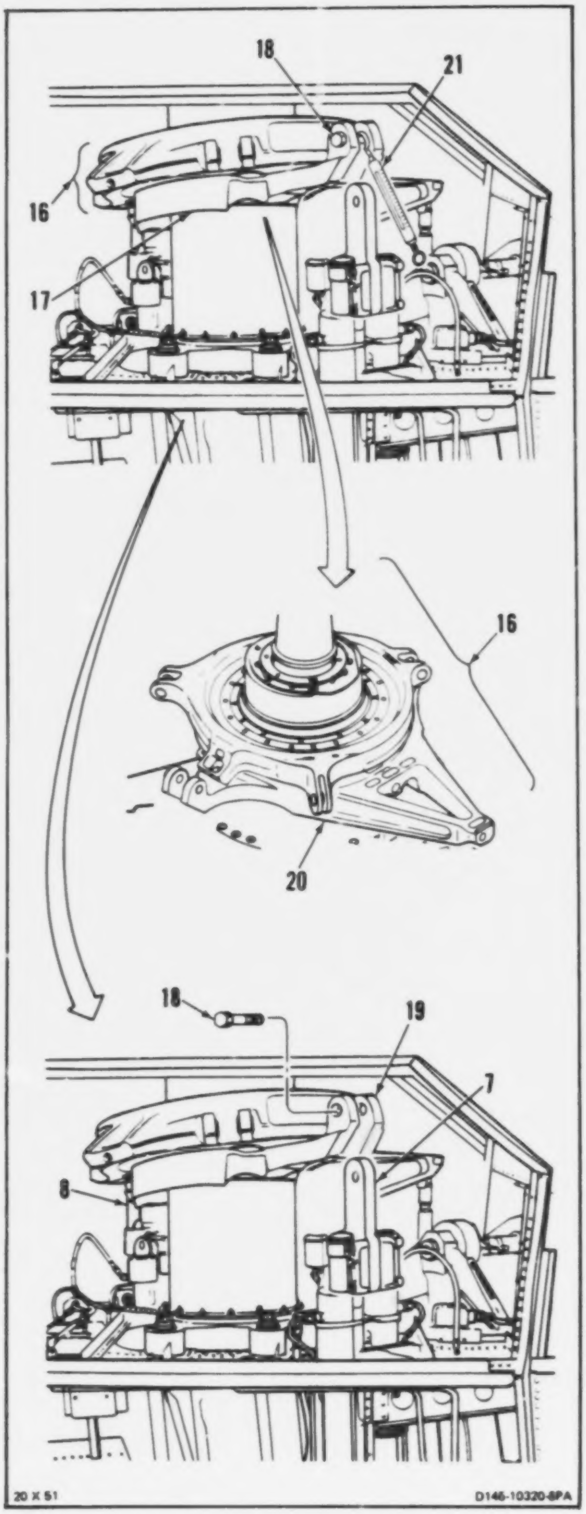
Do not read force needed to start swashplate tilt. This includes added force needed to overcome inertia.

16. If force in step 15 is 1.25 pounds or less, check axial movement of swashplate stationary ring (20). If movement is more than 1/8-inch, replace swashplate (16) (Task 5-115 and 5-132, or 5-116 and 5-133).

17. If force in step 15 is more than 63.5 pounds, replace swashplate (16).

18. Remove scale (21). Remove bolts (18).

19. Position lugs (19) over actuating cylinders (7 and 8).



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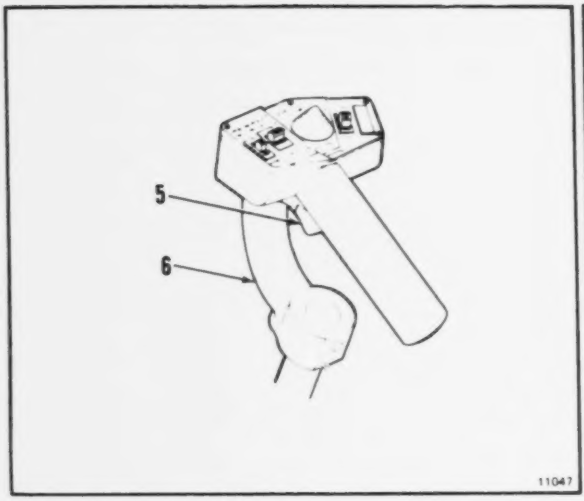
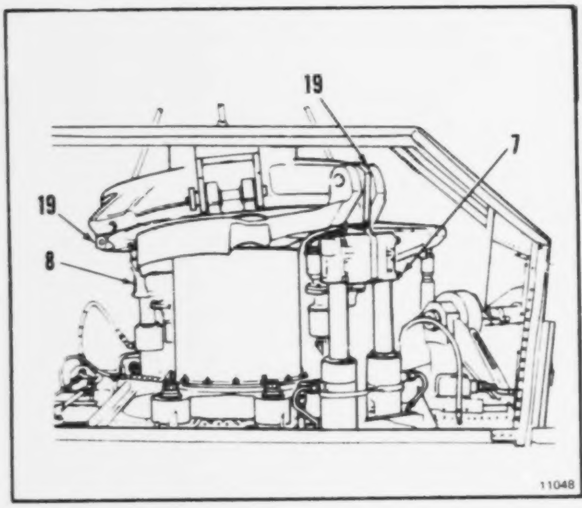
5-114 BALL SPHERICAL BEARING FRICTION CHECK (Continued) 5-114

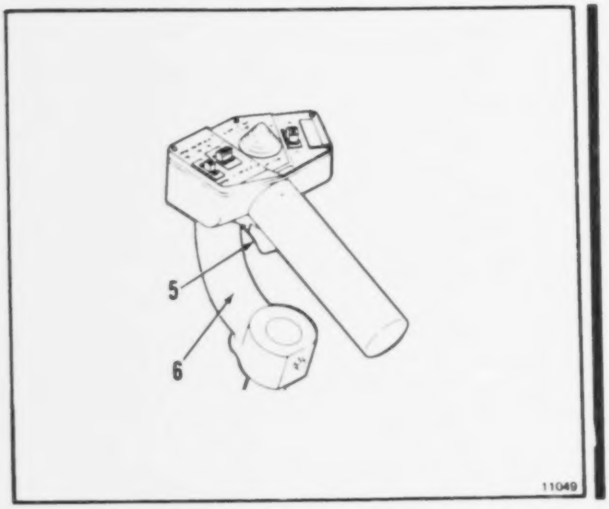
20. **Apply electrical power** to helicopter.
21. **Apply hydraulic power** to helicopter.
22. Press THRUST CONT BRAKE TRIGGER switch (5). **Raise thrust control (6)** slowly.



23. Align actuating cylinders (7 and 8) with swashplate lugs (19).



24. Release THRUST CONT BRAKE TRIGGER switch (5) of thrust control (6).



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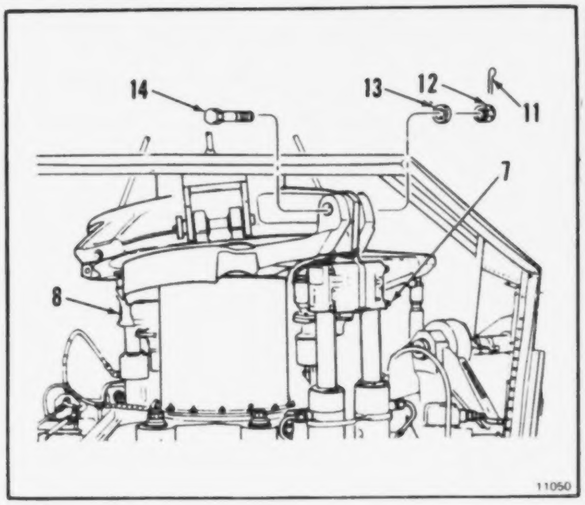
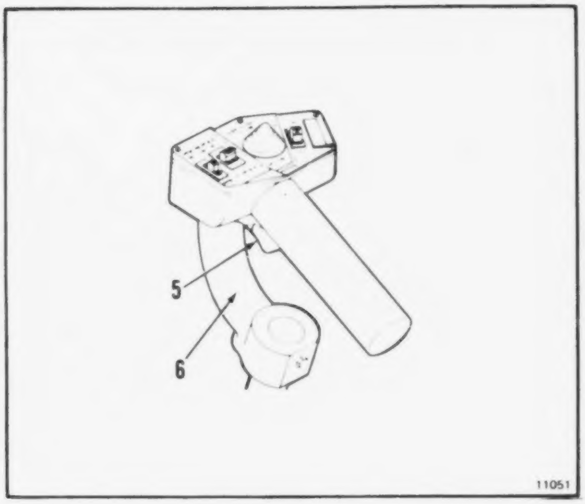
5-114 BALL SPHERICAL BEARING FRICTION CHECK (Continued) 5-114

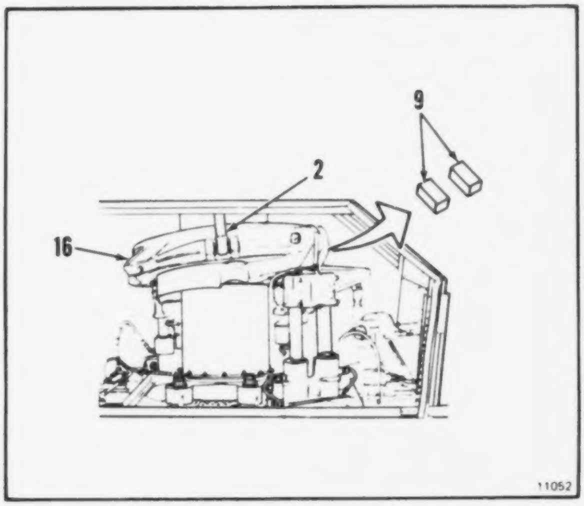
25. **Install bolts (14), washers (13), and nuts (12) in actuating cylinders (7 and 8). Torque nuts to 290 to 410 inch-pounds**. Install cotter pins (11).



26. Press THRUST CONT BRAKE TRIGGER switch (5). Raise thrust control (6) slowly.



27. Remove two support blocks (9).
28. Position swashplate (16) for pitch link (2) installation.



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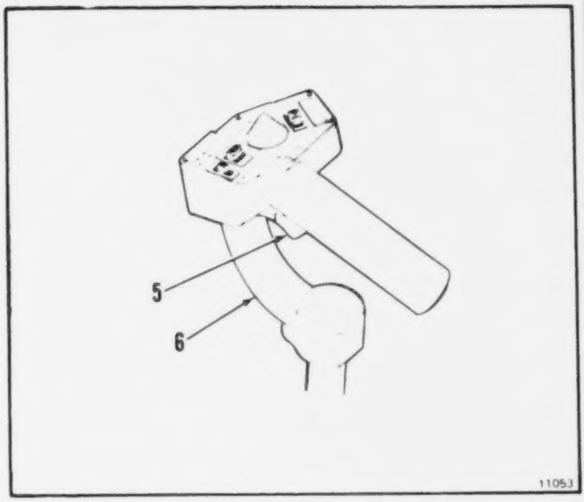
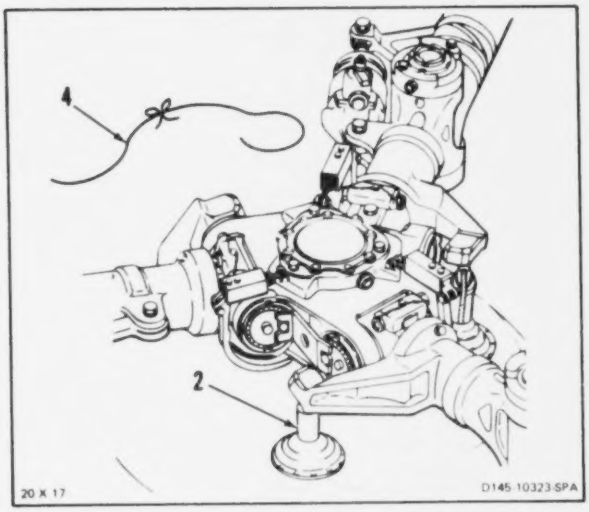
5-114 BALL SPHERICAL BEARING FRICTION CHECK (Continued) 5-114

29. Release THRUST CONT BRAKE TRIGGER switch (5).
30. Remove electrical and hydraulic power from helicopter.



31. Remove twine (E433) (4). Lower three pitch links (2).



FOLLOW-ON MAINTENANCE:

Connect pitch link upper end (Task 5-99).

Close work platforms (Task 2-2).

Remove tiedown lines from forward and aft blades (Task 1-26).

END OF TASK

5-114.1 SPHERICAL BALL/SPHERICAL BALL BEARING AXIAL PLAY CHECK 5-114.1

INITIAL SETUP

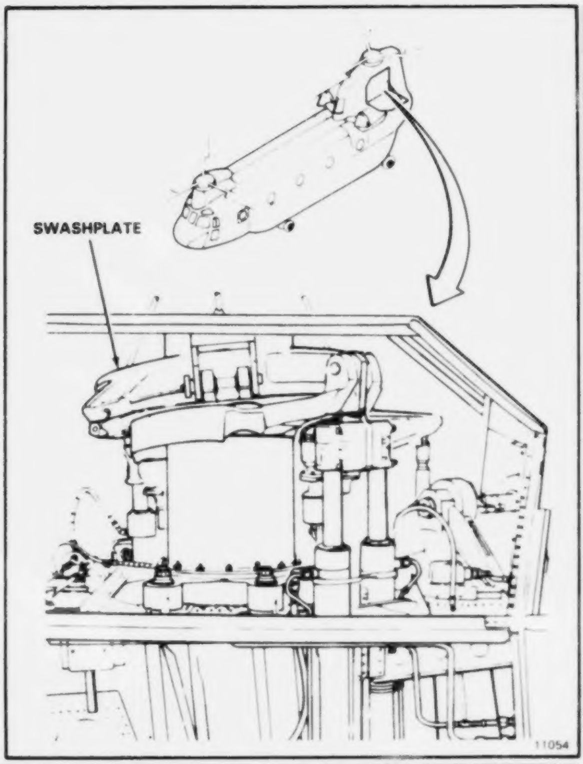
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Pencil

Materials:
Cardboard

Personnel Required:
Medium Helicopter Repairer (2)
Inspector

Equipment Condition:
Battery Connected (Task 1-39)
Electrical Power On
Hydraulic Power On
Work Platform Open, as Required (Task 2-2)
Tiedown Lines Installed on One Forward and One Aft Blade (Task 1-26)



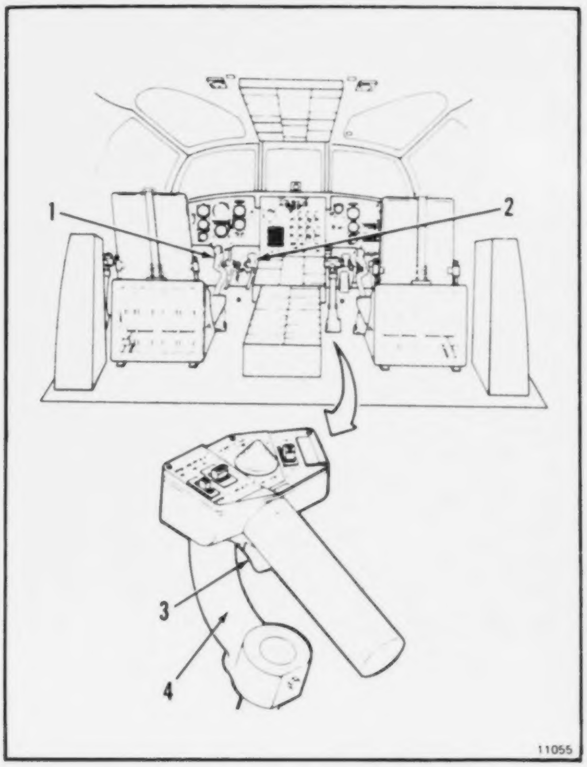
NOTE

Spherical ball/spherical ball bearing axial play check is same for forward or aft swashplate. Aft is shown here.

WARNING

Restrain blades when thrust control is raised or lowered to prevent injury to personnel and damage to the aircraft. Aft blade can hit the strobe light when thrust control is full up.

1. **Keep the control stick (1)** and directional pedals (2) at neutral position.
2. **Press the thrust control brake trigger (3).** Raise the thrust control (4) to full up.



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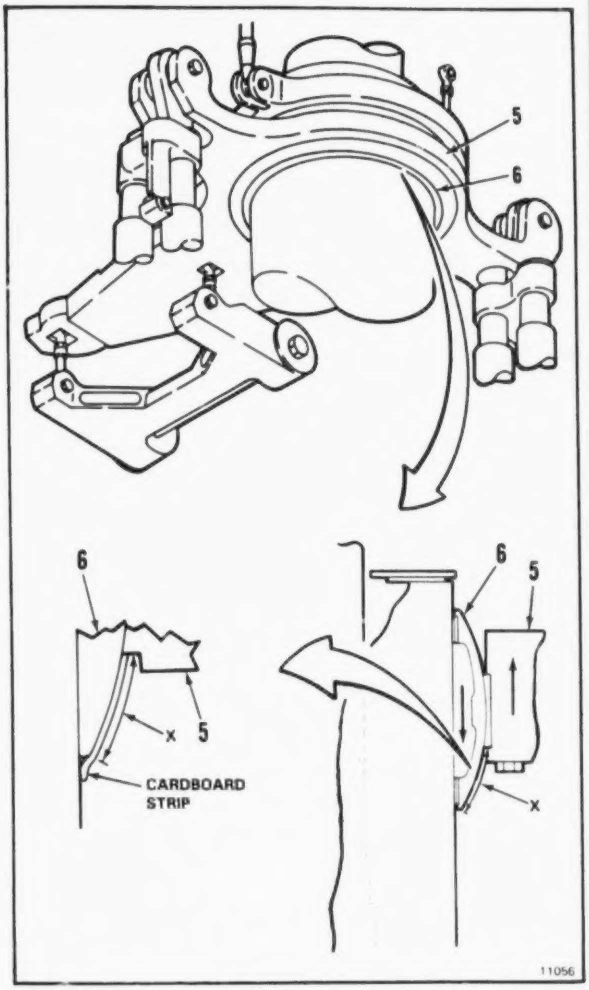
5-114.1 SPHERICAL BALL/SPHERICAL BALL BEARING AXIAL PLAY CHECK (Continued) 5-114.1

3. With the swashplate stationary inner ring (5) full up, **measure** the **height (X) of the exposed spherical ball (6)** below the swashplate stationary inner ring (5) at two places 180 degrees apart. Record height.

NOTE

Small cardboard strips can be used to measure the height.



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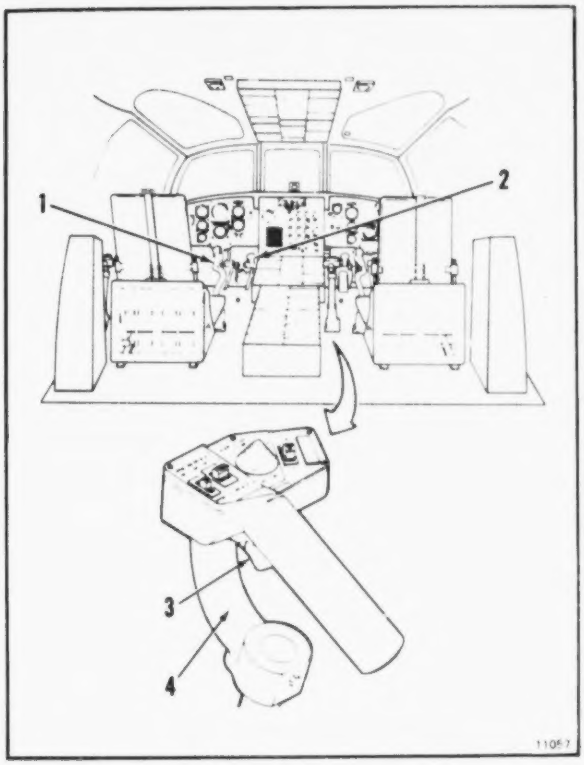
5-114.1 SPHERICAL BALL/SPHERICAL BALL BEARING AXIAL PLAY CHECK (Continued) 5-114.1

4. **Keep the control stick (1)** and directional control pedals (2) at neutral position.
5. **Press the thrust control brake trigger (3).** Lower the thrust control (4) to mid-travel position.



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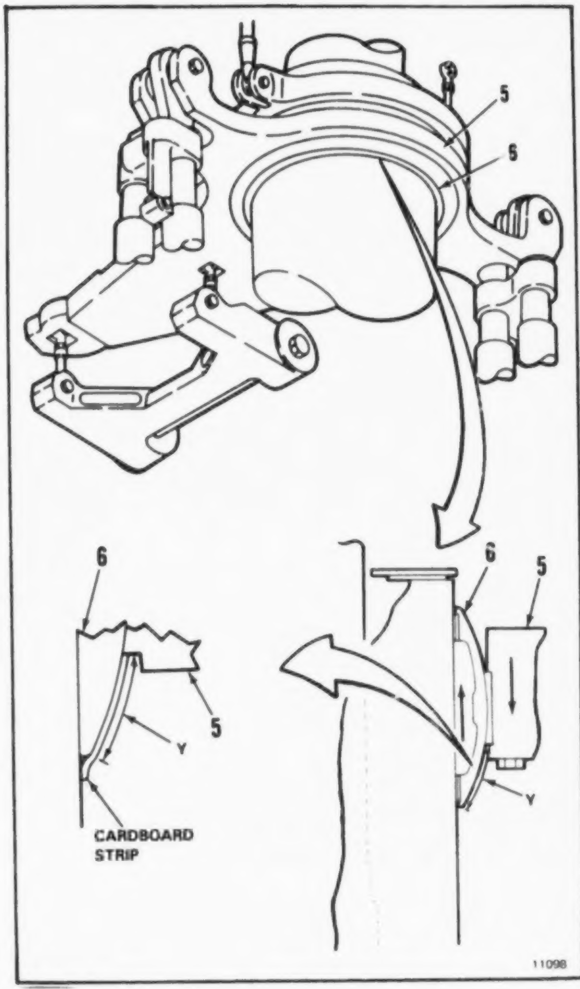
5-114.1 SPHERICAL BALL/SPHERICAL BALL BEARING AXIAL PLAY CHECK (Continued) 5-114.1

6. With the swashplate stationary inner ring (5) at mid-travel position, **measure the height (Y) of the exposed spherical ball (6)** below the swashplate stationary inner ring (5) at two places 180 degrees apart. Use cardboard. Record height. If the spherical ball (6) moves down after the swashplate movement has stopped, support the ball in its uppermost position before making the measurement.
7. **Subtract Y** in step 6. **from X** in step 3 to determine axial play. Results shall not exceed 1/8-inch.



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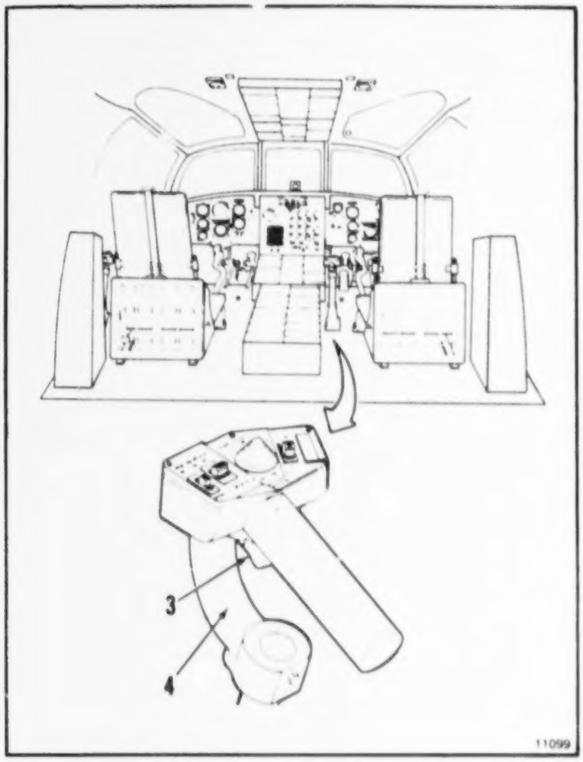
5-114.1 SPHERICAL BALL/SPHERICAL BALL BEARING AXIAL PLAY CHECK (Continued) 5-114.1

8. Press thrust control brake trigger (3) and move thrust control (4) down.



FOLLOW-ON MAINTENANCE:

Remove electrical power.

Remove hydraulic power.

Close work platforms (Task 2-2).

END OF TASK

5-115 CHECK SWASHPLATE BEARING FRICTION 5-115

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic Tool Kit, NSN 5180-00-323-4692

Dial Indicating Scale, 0 to 50 Pounds

Torque Wrench, 30 to 150 Inch-Pounds

Torque Wrench, 100 to 750 Inch-Pounds

Materials:

Grease (E190)

Parts:

Cotter Pin

Personnel Required:

Medium Helicopter Repairer

Inspector

Army Rotary-Wing Aviator (2)

References:

TM 55-1520-240-23P

TM 55-1500-204-25/1

TM 55-1520-240-10

Task 5-99

Task 5-115

Task 5-132

Task 5-116

Task 5-133

Task 2-2

Task 1-26

Task 1-90

Equipment Condition:

Battery Disconnected (Task 1-39)

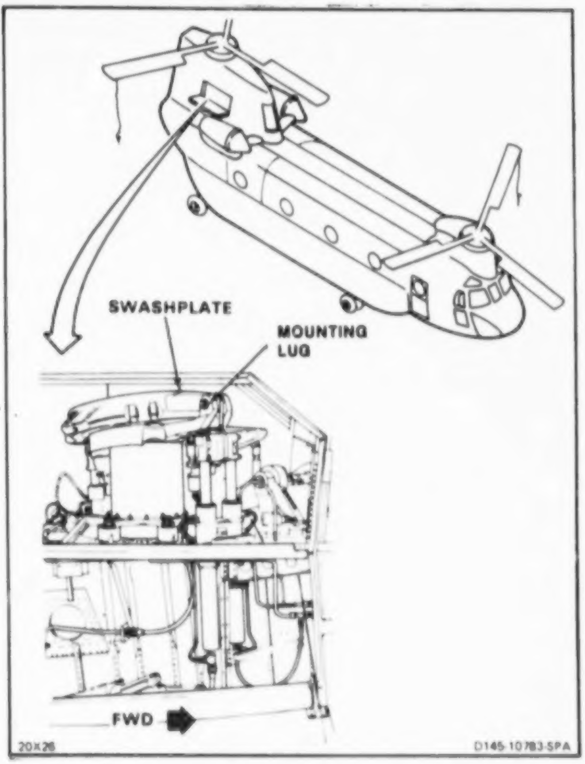
Electrical Power Off

Hydraulic Power Off

One Forward and One Aft Blade Tied-Down (Task 1-26)

Work Platforms Open as Required (Task 2-2)

Forward and Aft Pitch Links Disconnected (Task 5-97)



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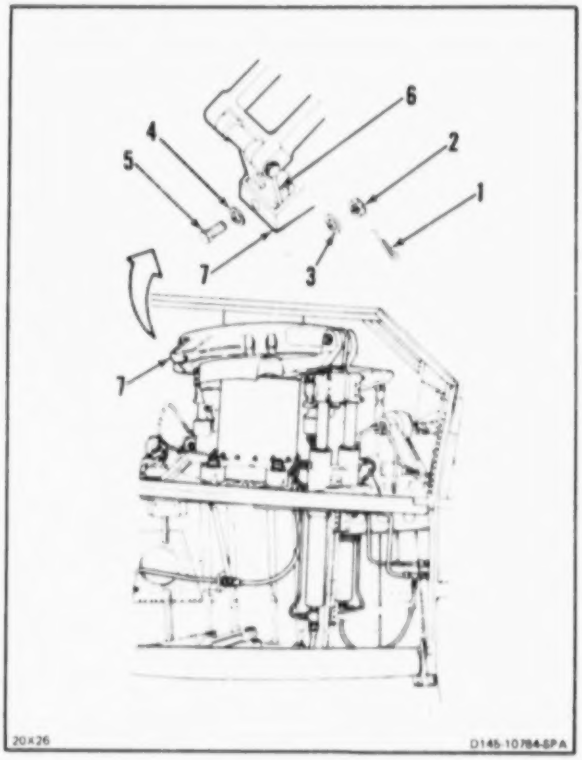
5-115 CHECK SWASHPLATE BEARING FRICTION (Continued) 5-115



NOTE

Positive retention bolts are installed in upper controls. They have a pawl which prevents nut or bolt removal unless pawl is depressed.

CHECK AFT SWASHPLATE BEARING FRICTION

1. Remove cotter pin (1), nut (2), washers (3 and 4), and bolt (5). **Remove lower drive arm (6)** from swashplate lugs (7).

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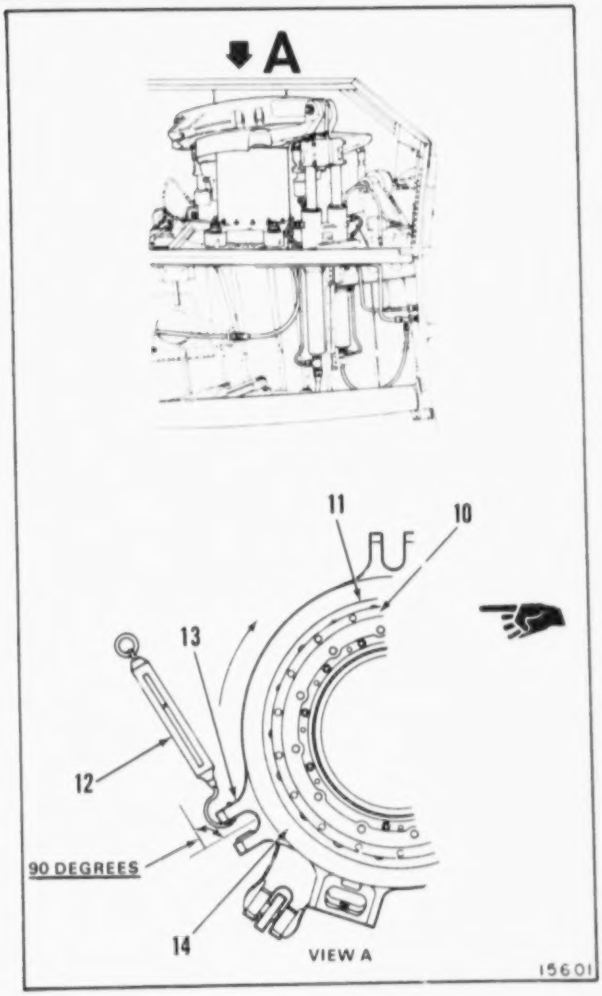
5-115 CHECK SWASHPLATE BEARING FRICTION (Continued) 5-115



2. Deleted.
3. Check that grease appears in a continuous bead all around overlap between stationary seal (10) and rotating seal (11).
4. **Hook dial scale (12) to lug (13).** Position scale at 90 degrees to lug.

NOTE

Do not use reading indicated as swashplate starts to move. Starting force is greater than friction force.

5. **Pull scale (12) to move rotating ring (14). Read scale** after ring is moving. If force is less than 30 pounds, go to step 6. If force exceeds 30 pounds, go to step 11.

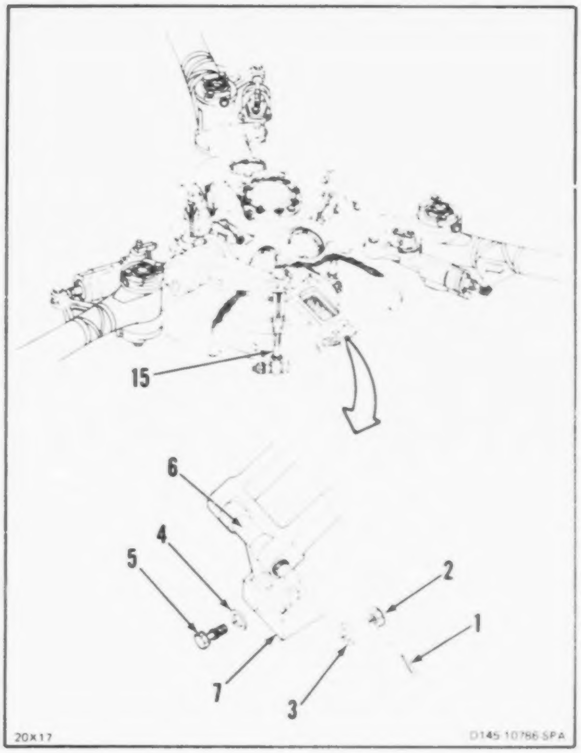
INSPECT

GO TO NEXT PAGE

5-115 CHECK SWASHPLATE BEARING FRICTION (Continued) 5-115

6. **Connect three pitch links (15)** (Task 5-99).

7. **Position lower drive arm (6) in lugs (7). Install bolt (5),** washers (3 and 4), and nut (2). **Torque nut to 80 to 150 inch-pounds above friction torque.** Install cotter pin (1) (TM 55-1500-204-25/1).



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5-115 CHECK SWASHPLATE BEARING FRICTION (Continued) 5-115

CHECK FORWARD SWASHPLATE BEARING FRICTION

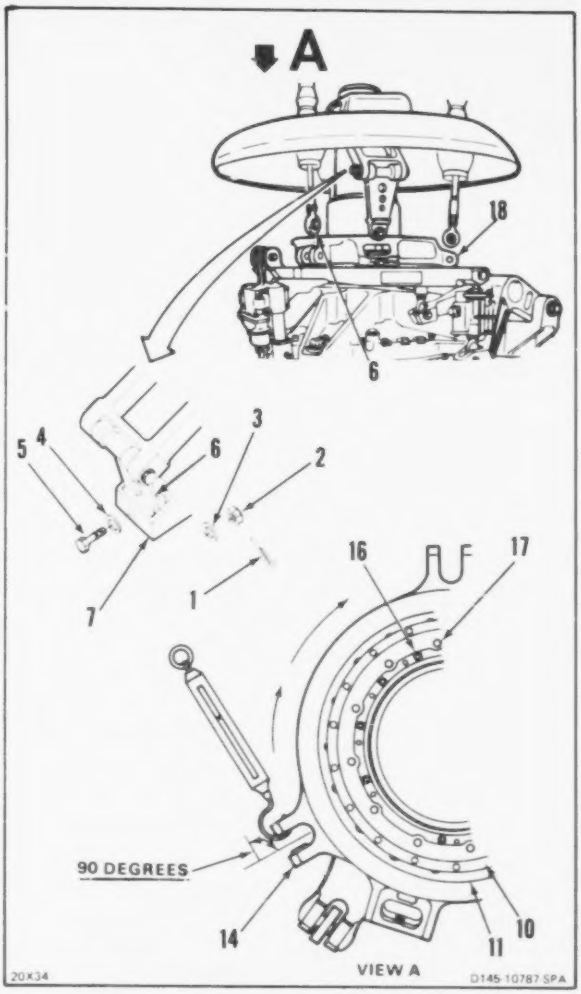
8. Remove cotter pin (1), nut (2), washers (3 and 4), and bolt (5). Remove **lower drive arm (6)** from swashplate lugs (7).
9. **Check that nuts (16) and nuts (17) are lockwired.**
10. **Perform steps 4 and 5.** If force does not exceed 30 pounds, perform steps 6 and 7, and go to FOLLOW-ON MAINTENANCE. If force exceeds 30 pounds, go to step 11.

RECHECK SWASHPLATE BEARING FRICTION ON FORWARD OR AFT SWASHPLATE

NOTE

Force to move swashplate may not exceed 30 pounds. Step 11 may not be performed more than once.

11. **If force required to move swashplate ring (14) in steps 5 or 10 exceeded 30 pounds, proceed as follows:**
    a. Pump grease (E190) into swashplate (18) to purge old grease. Rotate ring (14) 360 degrees as grease is pumped. Fill until clean grease appears 3/4 of distance around seals (10 and 11) (Task 1-90).
    b. Check purged grease for metal particles. There shall be no metal particles. If metal particles are found, replace swashplate (Tasks 5-115 and 5-132 (forward) or 5-116 and 5-133 (aft).
    b.1. Repeat steps 4. and 5. If force does not exceed 30 pounds, go to step c. If force exceeds 30 pounds, replace swashplate.
    c. Connect three pitch links (15) (Task 5-99). Connect lower drive arm (6) (step 7).



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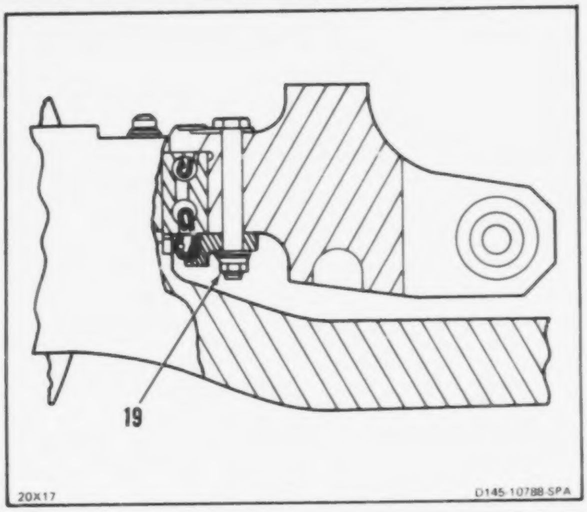
d. **Check that 18 nuts (19) are torqued to 365 inch-pounds** (TM 55-1500-204-25/1).



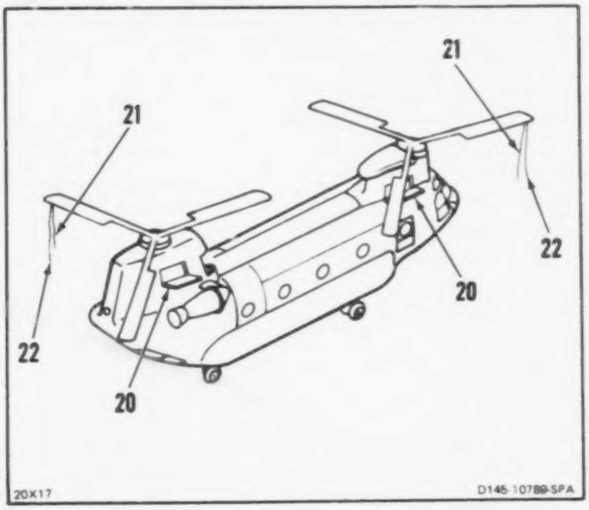
e. **Close work platforms (20)** (Task 2-2).

f. Pull lanyards (21) and **release two tiedown lines (22).**

g. **Apply electrical power** to helicopter.

h. **Have pilot start engines and operate at ground idle for 5 minutes** (TM 55-1520-240-10).

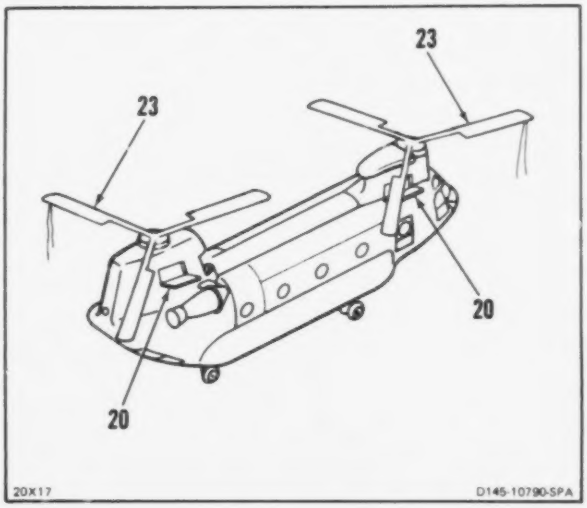
i. Turn off electrical power.



j. **Open work platforms (20)** as required (Task 2-2).

k. **Tie down one forward and one aft rotary-wing blade (23)** (Task 1-26).

l. Repeat steps 1 through 5. If force is less than 30 pounds, go to Follow-On Maintenance. If force is more than 30 pounds, replace swashplate (Task 5-115 and 5-132, or 5-116 and 5-133). If aft swashplate is replaced, check forward swashplate friction (step 8 thru 10).



INSPECT

FOLLOW-ON MAINTENANCE:

Remove blade tiedown lines (Task 1-26).

Close work platforms (Task 2-2).

END OF TASK

5-116 REMOVE FORWARD SWASHPLATE 5-116

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Controls Sling (T14)

Hoist

Materials:

None

Personnel Required:

Medium Helicopter Repairer (2)

Equipment Condition:

Battery Disconnected (Task 1-39)

Electrical Power Off

Hydraulic Power Off

Two Aft Rotary-Wing Blades Tied Down (Task 1-26)

Forward Work Platforms Open (Task 2-2)

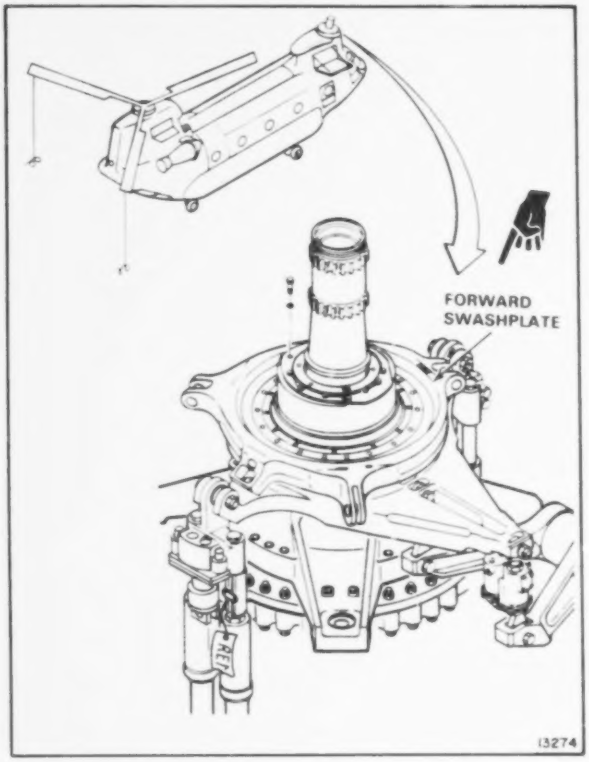
Forward Rotary-Wing Blades Removed (Task 5-64)

Forward Rotary-Wing Head Removed (Task 5-8)

Forward Drive Arms Removed (Task 5-101)

Forward Weather Protective Cover, Drive Collar, and Pitch Links Removed (Task 5-100)

Servocylinder Safety Blocks Installed (Task 11-28)



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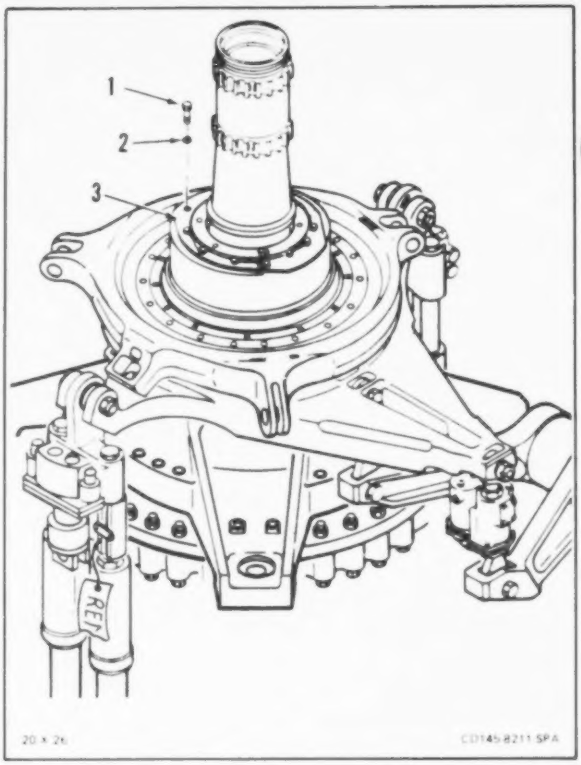
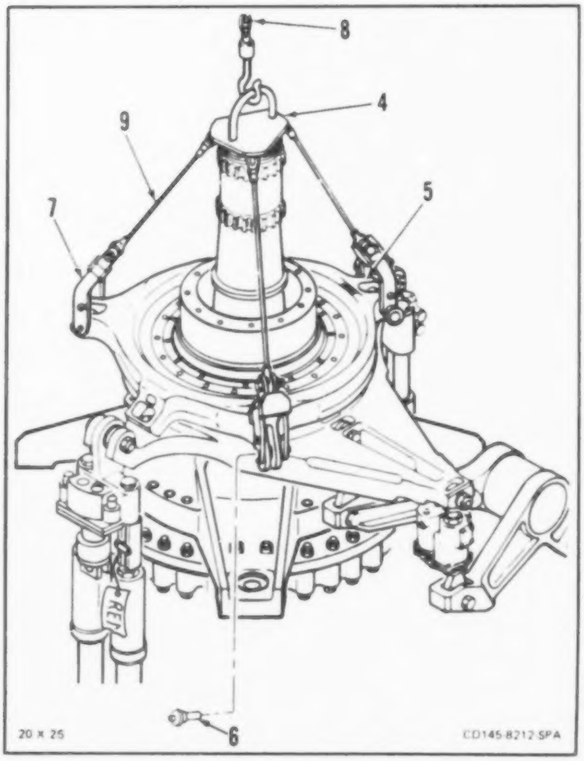
5-116 REMOVE FORWARD SWASHPLATE (Continued) 5-116

NOTE

- Positive retention bolts are installed in the upper controls. They have a pawl which prevents nut or bolt removal unless the pawl is depressed (Task 1-14).
- Swashplate is also removed as part of forward transmission package (Task 6-47).



1. Remove lockwire. Remove 12 bolts (1) and washers (2). **Remove slider shaft seal (3).**



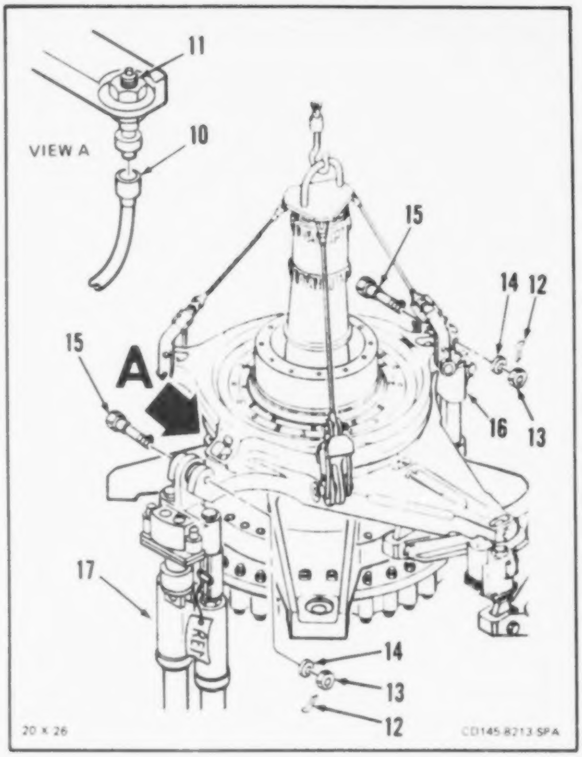
2. **Attach sling (T14) (4)** to three lugs (5) as follows:
   a. Remove three quick-release pins (6).
   b. Position links (7) on lugs (5).
   c. Install pins (6).
3. **Attach hoist chain (8)** to sling (T14) (4). Raise hoist to **take-up slack from sling cables (9).**

GO TO NEXT PAGE

5-116 REMOVE FORWARD SWASHPLATE (Continued) 5-116

4. **Remove connector (10)** from magnetic phase detector (11).

5. **Remove** cotter pin (12), nut (13), washer (14), and **bolt (15)** from upper end of both servocylinders (16 and 17).


11
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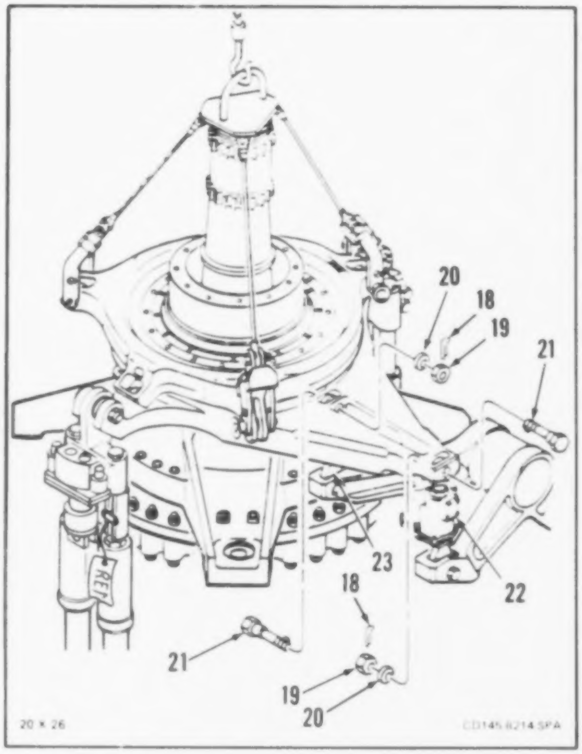
CD145 8213 SPA

CAUTION

If actuator or link drop, they can be damaged or cause damage to other components.

6. **Remove** cotter pins (18), nuts (19), washers (20), and **bolts (21)** from actuator (22) and link (23). Have helper support actuator and link and lower slowly.


20
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20 x 26
CD145 8214 SPA

GO TO NEXT PAGE

5-116 REMOVE FORWARD SWASHPLATE (Continued) 5-116

7. Install guide rope (24).

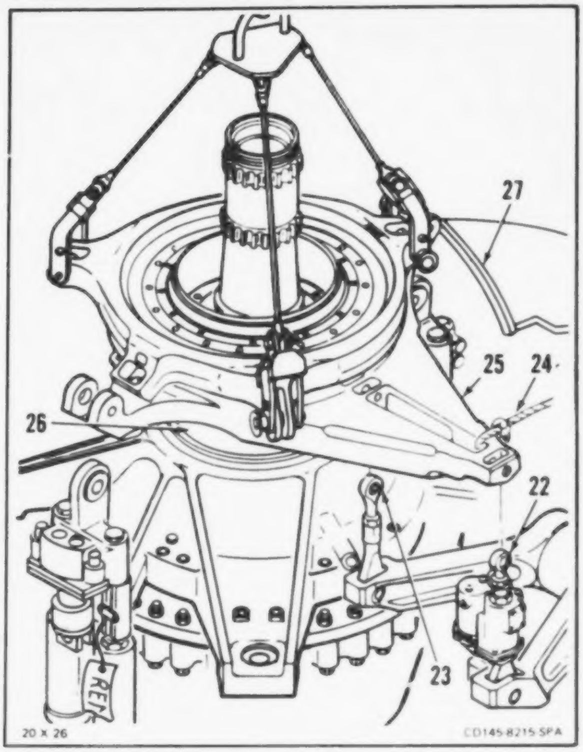
WARNING

Swashplate is heavy and can injure personnel if it drops. Swashplate must be supported by hoist and moved carefully to prevent injury to personnel.

CAUTION

If bearing hits or binds on slider shaft, bearing surfaces can be damaged.

8. **Lift swashplate (25)** from shaft (26). Do not let actuator (22) or link (23) fall. Have helper lower yoke end of swashplate to clear fairing (27). Do not let swashplate hit or bind on shaft.

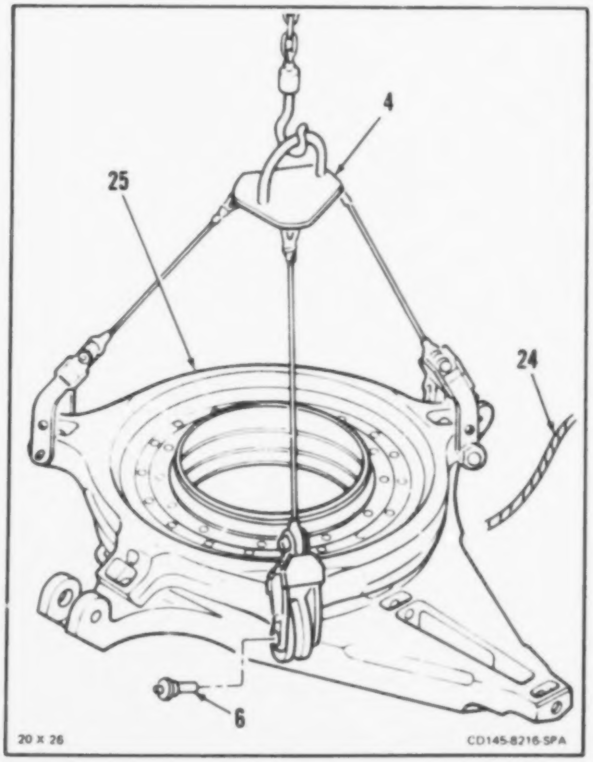


9. Lower swashplate (25) onto wood or other soft surface. Remove guide line (24).

10. Remove pins (6). Remove **controls sling (T14) (4).**

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-117 REMOVE AFT SWASHPLATE 5-117

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Controls Sling (T14)

Hoist

Materials:

None

Personnel Required:

67U10 Medium Helicopter Repairer (2)

67U20 Medium Helicopter Repairer

Equipment Condition:

Battery Disconnected (Task 1-39)

Electrical Power Off

Hydraulic Power Off

Two Forward Rotary-Wing Blades Tied Down (Task 1-26)

Pylon Work Platforms Open (Task 2-2)

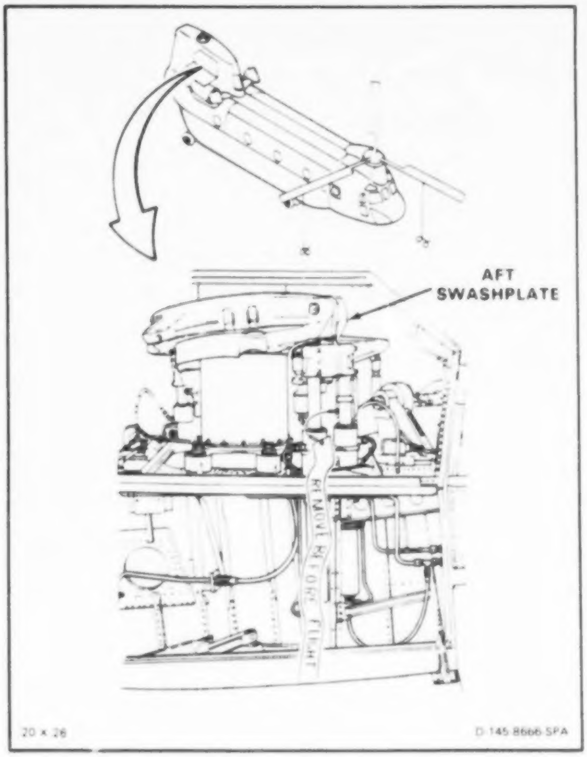
Aft Rotary-Wing Blades Removed (Task 5-64)

Aft Rotary-Wing Head Removed (Task 5-8)

Aft Drive Arms Removed (Task 5-101)

Aft Weather Protective Cover, Drive Collar, and Pitch Links Removed (Task 5-100)

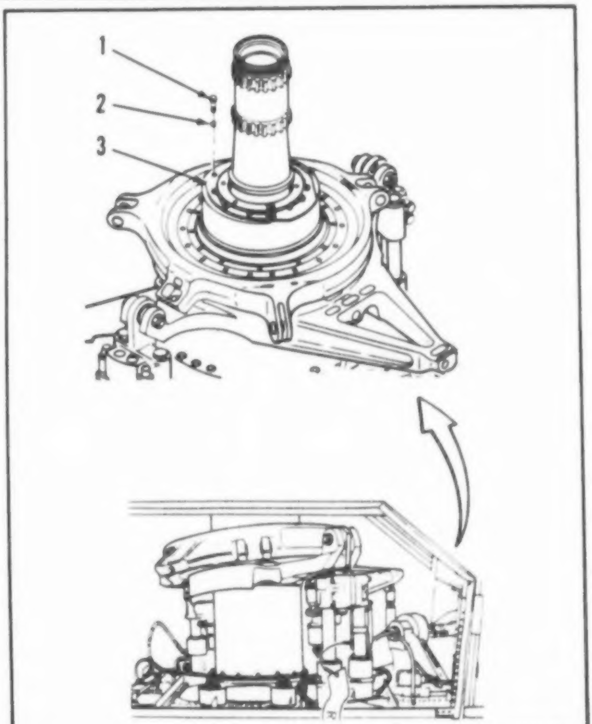
Servocylinder Safety Blocks Installed (Task 11-28)



NOTE

Positive retention bolts are installed in upper controls. They have a pawl which prevents nut or bolt removal unless pawl is depressed (Task 1-14).

1. Remove lockwire. Remove 12 bolts (1) and washers (2). **Remove shaft seal (3).**



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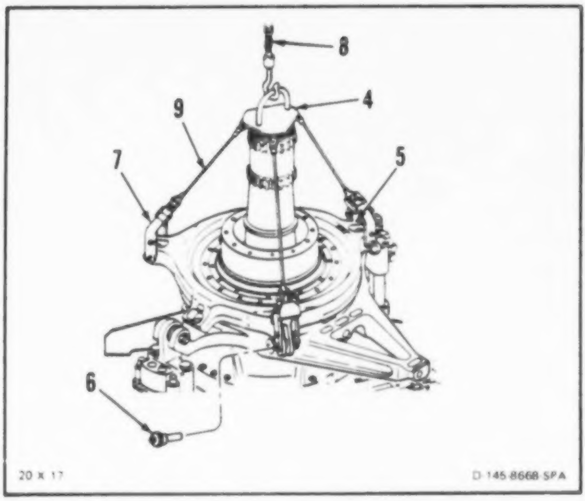
5-117 REMOVE AFT SWASHPLATE (Continued) 5-117


8
4
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D-145-8668 SPA

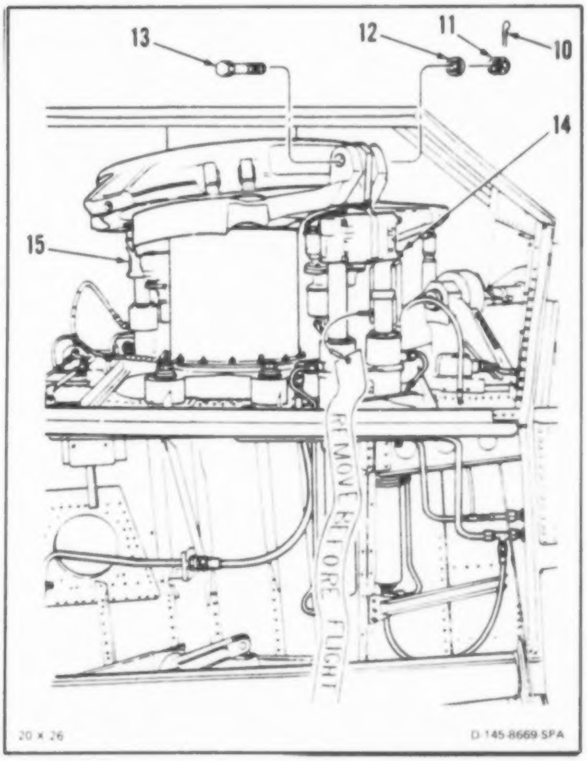
2. **Attach controls sling (T14) (4)** to three lugs (5) as follows:

   a. Remove three quick-release pins (6).

   b. Position links (7) on lugs (5).

   c. Install pins (6).

3. Attach hoist chain (8) to sling (T14) (4). Raise hoist to **take up slack from sling cables (9).**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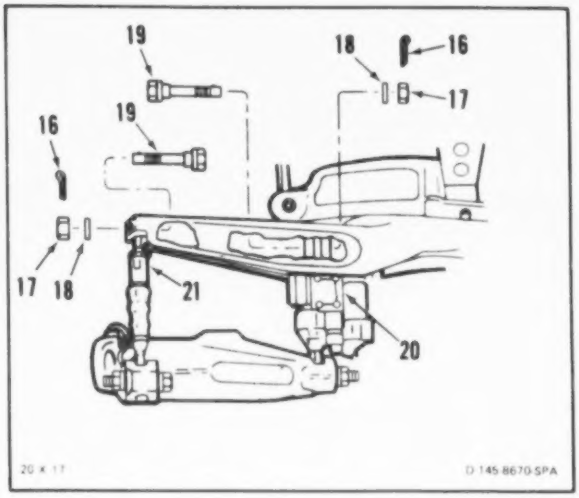
REMOVE BEFORE FLIGHT
20 x 26
D-145-8669 SPA

4. **Remove** cotter pin (10), nut (11), washer (12), and **bolt (13) from** upper end of **two servocylinders (14 and 15).**

GO TO NEXT PAGE

5-117 REMOVE AFT SWASHPLATE (Continued) 5-117

5. **Remove** cotter pins (16), nuts (17), washers (18), and **bolts (19) from actuator (20) and link (21).** Have helper support actuator and link and lower slowly.


19
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20 x 17
D 145-8670-SPA

6. Install guide rope (22).

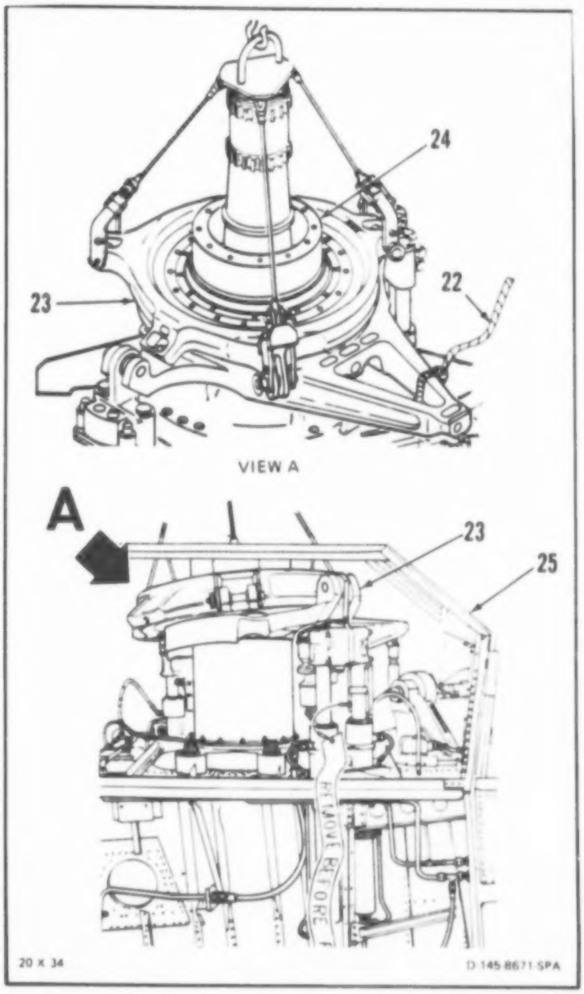
WARNING

Swashplate is heavy and can injure personnel if it drops. Swashplate must be supported by hoist and moved carefully to prevent injury to personnel.

CAUTION

If bearing hits or binds on slider shaft, bearing surfaces can be damaged.

7. **Lift swashplate (23)** from shaft (24). Have helper lower yoke end of swashplate to clear pylon (25). Do not let swashplate hit or bind on shaft.


24
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D 145-8671-SPA

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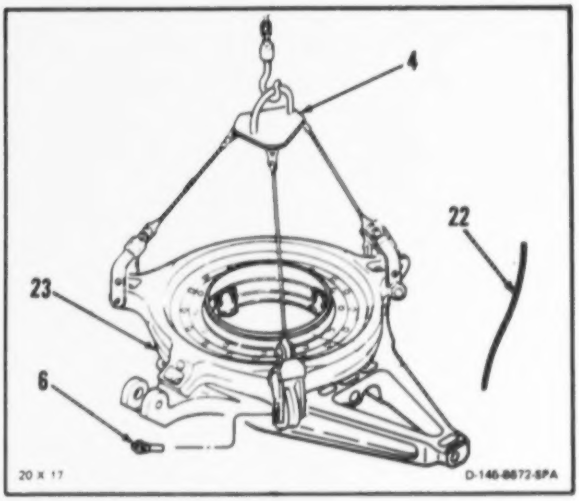
5-117 REMOVE AFT SWASHPLATE (Continued) 5-117

8. **Lower swashplate (23)** onto wood or other soft surface. Remove guide line (22).
9. Remove pins (6). Remove controls sling (T14) (4).


4
22
23
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20 X 17
D-146-8872-SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-118 CLEAN REMOVED SWASHPLATE 5-118

INITIAL SETUP

Applicable Configurations:
All

Tools:
Fiber Brush
Goggles

Materials:
Cloth (E120)
Dry Cleaning Solvent (E162)
Gloves (E186)

Personnel Required:
67U10 Medium Helicopter Repairer

Equipment Condition:
Off Helicopter Task

WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

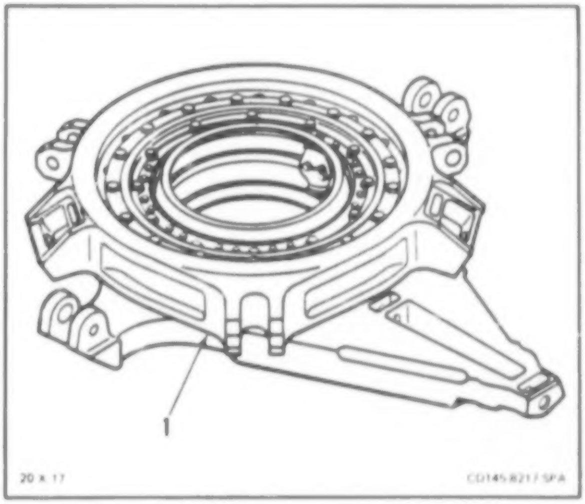
CAUTION

Do not use excessive solvent (E162). Too much solvent can wash foreign material into bearing and seal areas.

1. **Clean swashplate (1).** Use cloth (E120) fiber brush, and solvent (E162). Wear goggles. Wear gloves (E186).

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-119 INSPECT SWASHPLATE ROTATING RING 5-119

INITIAL SETUP

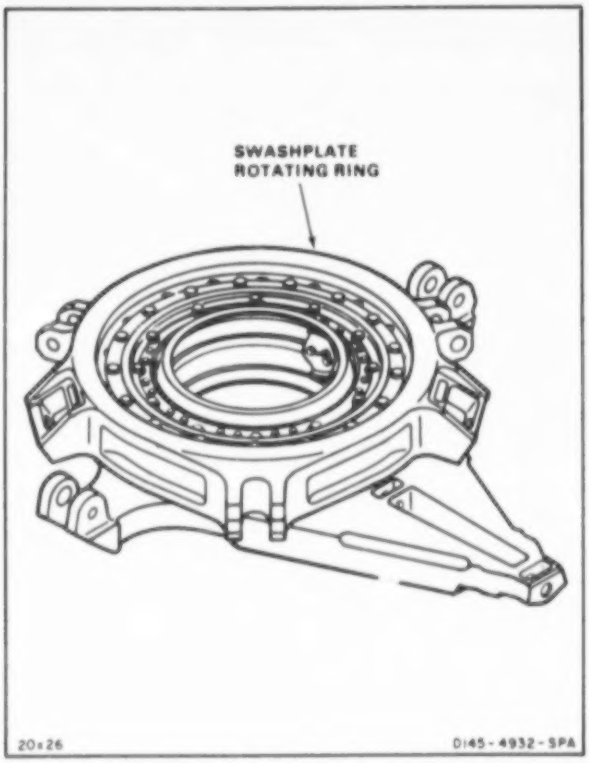
Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit, NSN 5180-00-323-5114

Materials:
None

Personnel Required:
67U30 Inspector

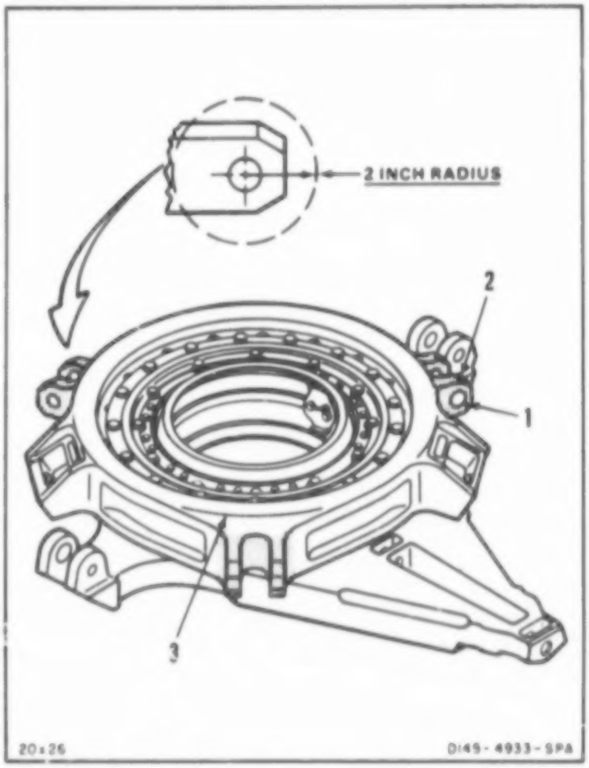
Equipment Condition:
Off Helicopter Task



NOTE

Procedure is same to inspect forward or aft swashplate rotating rings.

1. **Check for nicks or scratches within 2-inches of center of holes (1) in six lugs (2)** of rotating ring (3). Damage less than 0.005-inch in depth shall be accepted without rework. Repair damage 0.005-inch to 0.020-inch in depth (Task 5-120).
2. **Check for nicks or scratches in all other surface areas of rotating ring (3).** Damage less than 0.010-inch in depth shall be accepted without rework. Repair damage 0.010-inch to 0.020-inch in depth (Task 5-120).



FOLLOW-ON MAINTENANCE

None

END OF TASK

5-119.1 INSPECT SWASHPLATE SLIDING SLEEVE BEARINGS 5-119.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Technical Inspection Tool Kit,
NSN 5180-00-323-5114

Materials:

Cloth (E120)

Personnel Required:

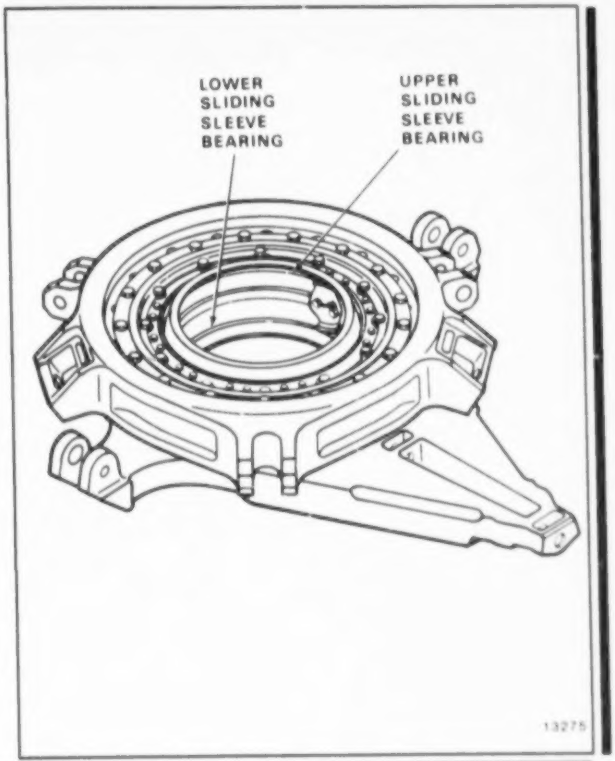
Inspector

References:

Task 5-123
Task 5-124

Equipment Condition:

Off Helicopter Task



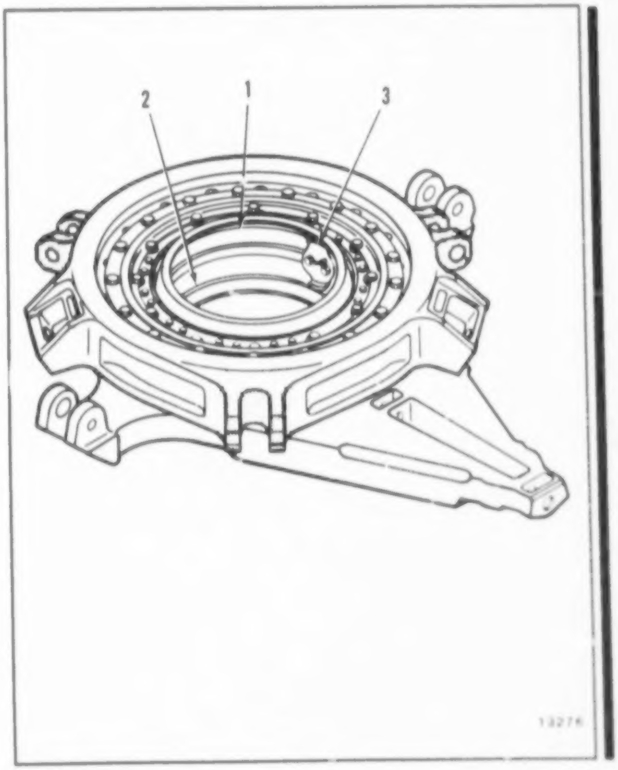
NOTE

Procedure is same to inspect forward or aft swashplate rotating rings.

1. Inspect bonded surface of upper and lower bearings (1 and 2) for the following:
    a. Unbonding.
    b. Nicks, scratches, or cracks.
    c. Abrasions or material worn to metal backing.
    d. Grease, oil, or solvent contamination that can not be removed with a dry cloth (E120).
2. If any of the above conditions are found, have the bearing replaced (Tasks 5-123 and 5-124).
3. Check screws and lockwire at each of three retainers (3) for security. Tighten if needed (Task 5-124).

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-120 REPAIR SWASHPLATE ROTATING RING (AVIM) 5-120

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114

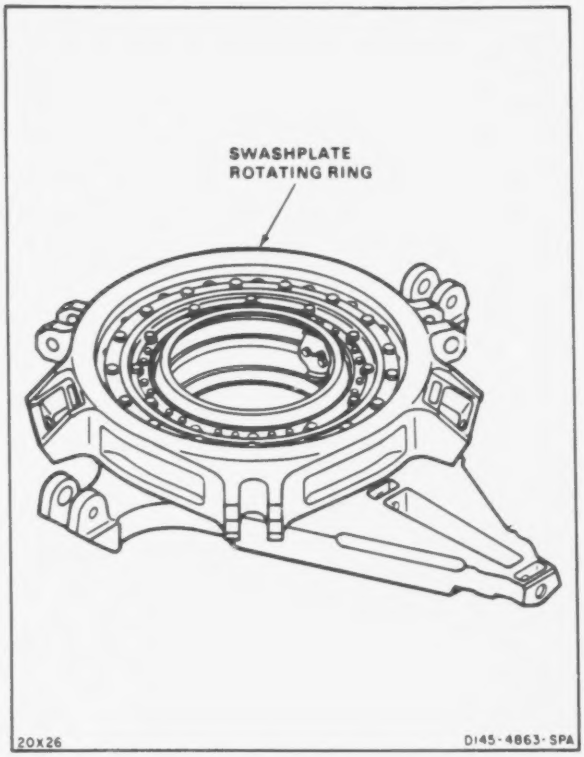
Materials:
Abrasive Paper (E10)
Alodine (E65)
Wash Primer (E302)
Zinc Chromate Primer (E291)
Gloves (E186)

Personnel Required:
68D10 Aircraft Powertrain Repairer
68D20 Aircraft Powertrain Repairer
68D30 Inspector

References:
TM 55-1520-240-23P

Equipment Condition:
Off Helicopter Task

General Safety Instructions:



WARNING

Wash primer (E302) and zinc chromate primer (E291) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

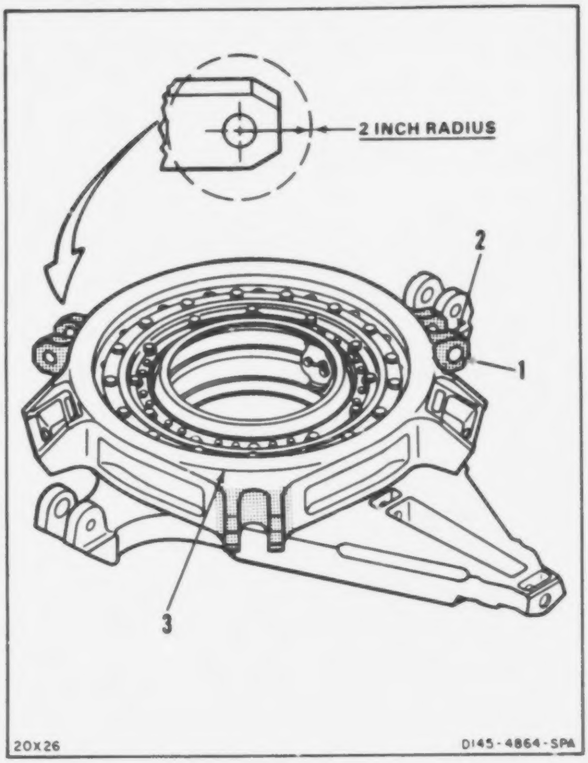
GO TO NEXT PAGE

5-120 REPAIR SWASHPLATE ROTATING RING (AVIM) (Continued) 5-120

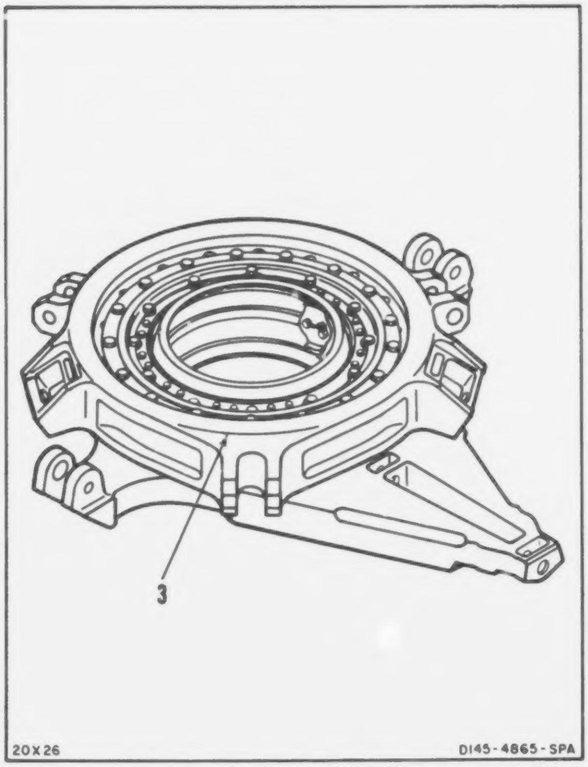
NOTE

Procedure is same to repair forward or aft swashplate rotating rings.

1. **Blend repair damage 0.005 inch to 0.020 inch in depth within 2 inches of hole center (1) in lugs (2).** Blend smooth. Use abrasive paper (E10). Rework shall not exceed 0.020 inch in depth.
2. **Check thickness of lugs (2) after rework.** Lug thickness shall not be less than 0.750 inch.
3. **Blend repair damage 0.010 inch to 0.020 inch in depth in all other areas of rotating ring (3).** Blend smooth. Use abrasive paper (E10). Rework shall not exceed 0.020 inch in depth.



INSPECT



WARNING

Alodine (E65) is an oxidizer. Discard cloths which contain this material in a separate container. If discarded with cloths contaminated with acetone, mek, or other organic solvents, combustion can result. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

4. **Apply alodine (E65)** to repaired area of ring (3). Wear gloves (E186).
5. **Apply one coat of wash primer (E302)** to repaired area of ring (3). Allow primer to dry for 30 minutes. Wear gloves (E186).
6. **Apply one coat of zinc chromate primer (E291)** to repaired area of ring (3). Allow primer to dry for 30 minutes. Wear gloves (E186).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-121 CHECK BALL SPHERICAL BEARING AXIAL PLAY 5-121

INITIAL SETUP

Applicable Configurations:
All

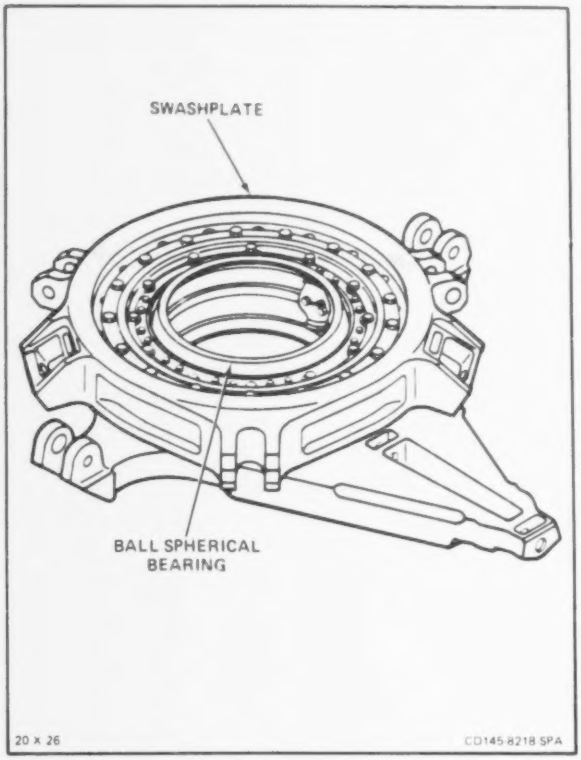
Tools:
Technical Inspection Tool Kit,
NSN 5180-00-323-5114
Pencil
Wood Blocks (3), 6 x 6 x 10 Inches

Materials:
None

Personnel Required:
67U10 Medium Helicopter Repairer
67U30 Inspector

Equipment Condition:
Off Helicopter Task
Task 5-117

References:
TM 55-1520-240-23P



NOTE

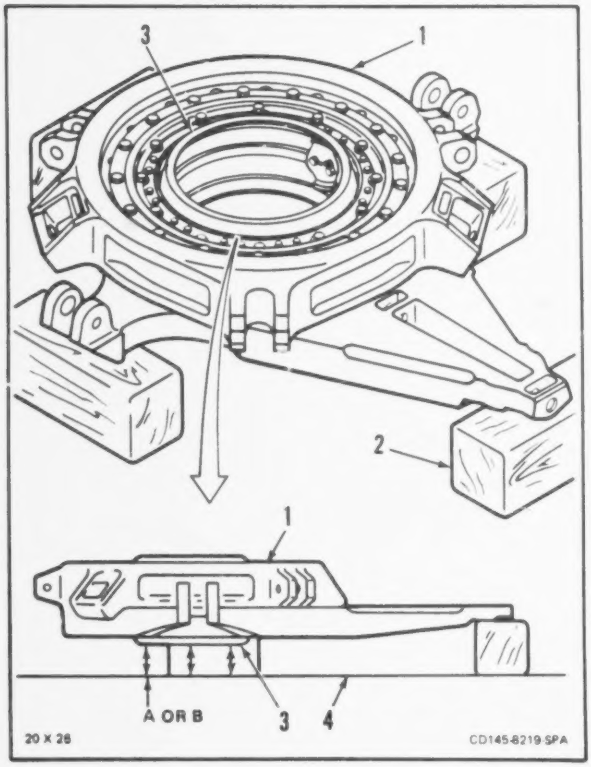
Procedure is same to check axial play in ball spherical bearing on forward or aft swashplate.

1. Place swashplate (1) on three wood blocks (2).
2. **Measure distance A** from bottom of ball spherical bearing (3) and flat work surface (4). Measure at three places. Record average measurement.
3. Have helper lift and support ball spherical bearing (3) as high as possible. **Measure distance B** at three places. Record average measurement.
4. **Subtract distance A in step 2 from average distance B measured in step 3.** Difference shall not exceed 0.125-inch.

FOLLOW-ON MAINTENANCE:

None

END OF TASK



5-122 REMOVE SWASHPLATE BALL SPHERICAL BEARING 5-122

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267

Mallet

Phenolic Drift, 1/2 Inch x 2 Inches x 10 Inches

Wood Blocks (9), 2 Inches x 4 Inches x 10 Inches

Materials:

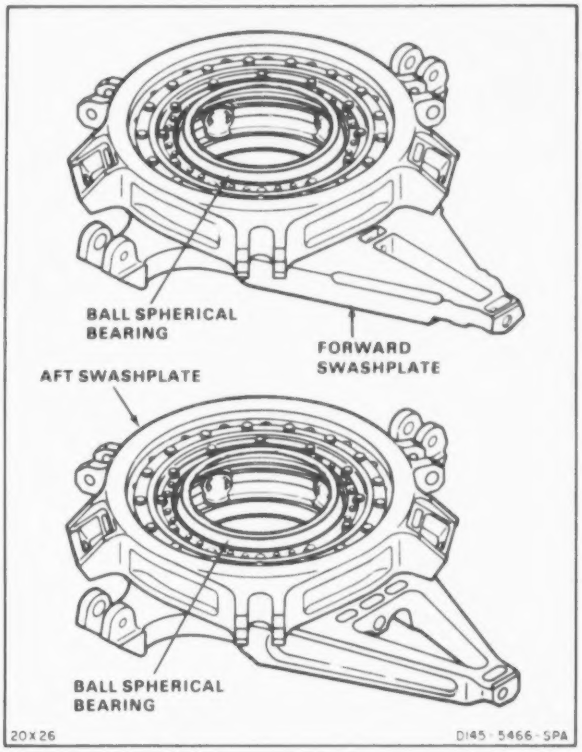
Marking Pencil (E271)

Personnel Required:

Aircraft Powertrain Repairer (2)

Equipment Condition:

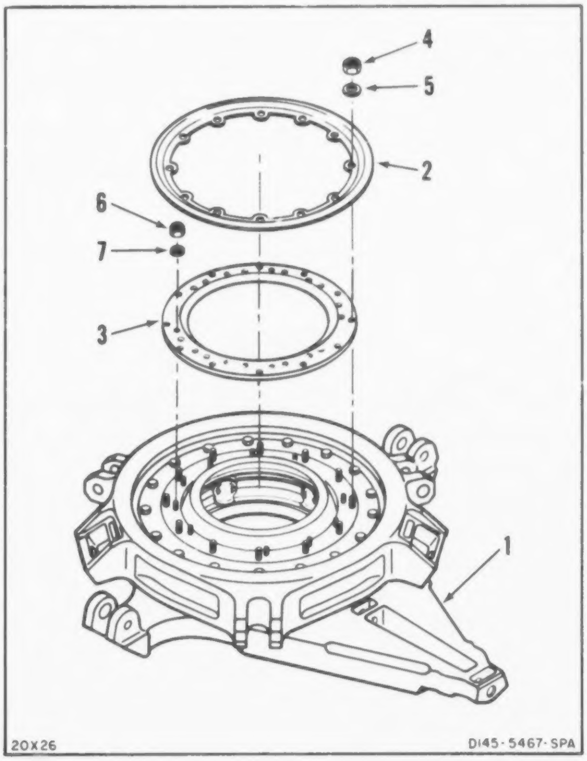
Off Helicopter Task


BALL SPHERICAL BEARING
FORWARD SWASHPLATE
AFT SWASHPLATE
BALL SPHERICAL BEARING
20X26
DI45-5466-SPA

NOTE

Procedure is similar to remove forward or aft swashplate ball spherical bearing. Differences are noted in text.

1. **For forward swashplate (1) only, remove seal (2) and upper retainer (3)** as follows:
   a. Remove 12 nuts (4) and washers (5). Remove seal (2).
   b. Remove 10 nuts (6) and washers (7). Remove upper retainer (3). Go to step 3.


4
5
2
6
7
3
1
20X26
DI45-5467-SPA

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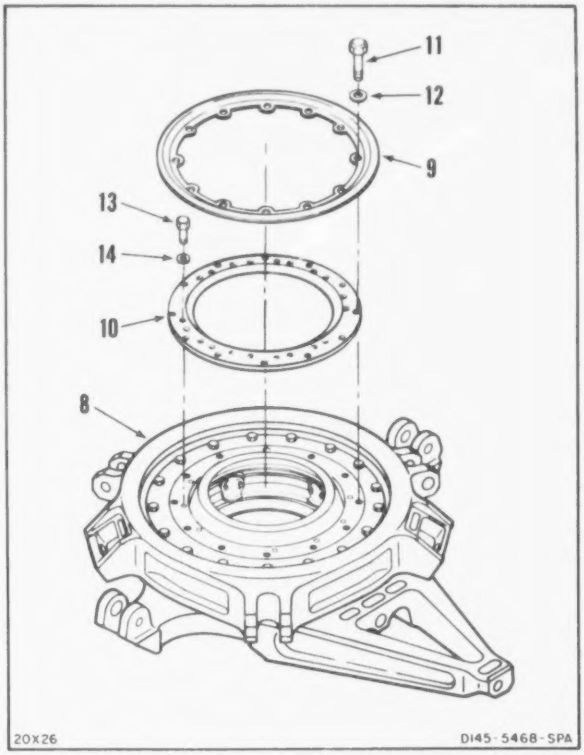
5-122 REMOVE SWASHPLATE BALL SPHERICAL BEARING (Continued) 5-122

2. **For aft swashplate (8) only, remove seal (9) and upper retainer (10)** as follows:

   a. Remove lockwire. Remove 12 bolts (11) and washers (12). Remove seal (9).

   b. Remove lockwire. Remove 10 bolts (13) and washers (14). Remove upper retainer (10). Go to step 3.



3. Turn swashplate (1 or 8) over. Rest swashplate on blocks (15).

4. **Matchmark spherical bearing (16), upper bearing (17), and retaining spacer (18) to stationary ring (19).** Use marking pencil (E271). Remove bearings and spacer from stationary ring by hand.

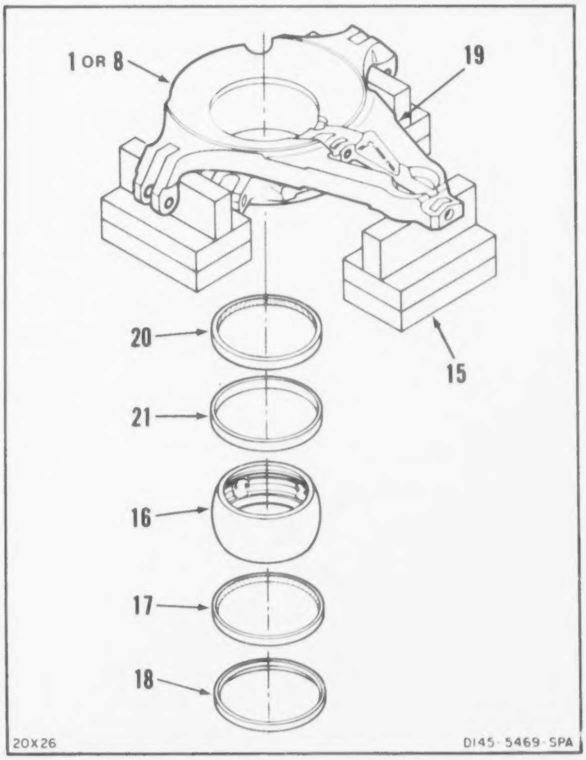
NOTE

If hand pressure will not remove bearing parts, use mallet against wood block across spherical bearing.

5. **Matchmark lower bearing (20) and bearing spacer (21) to stationary ring (19).** Use marking pencil (E271). Tap out bearing and spacer from stationary ring. Use phenolic drift.

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-123 REMOVE SWASHPLATE SLIDING SLEEVE BEARINGS (AVIM) 5-123

INITIAL SETUP

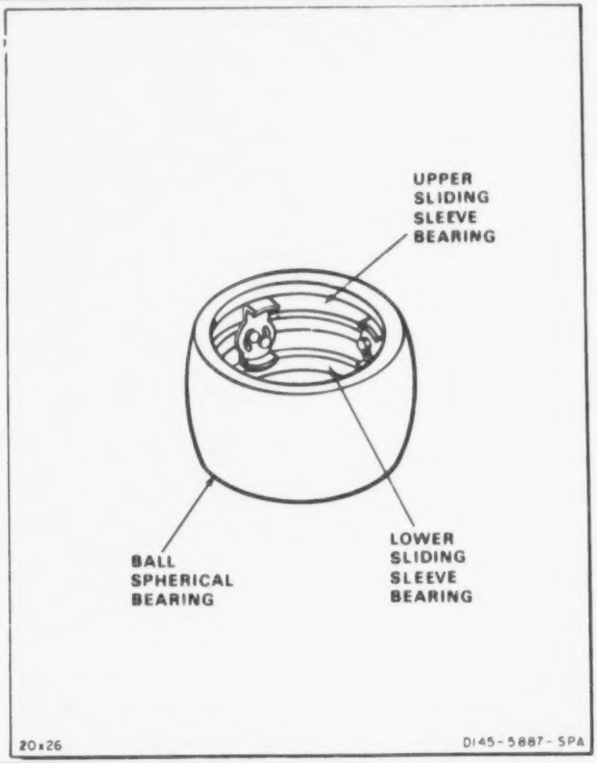
Applicable Configurations:
All

Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Arbor Press
Adapter (Appx E)

Personnel Required:
68D10 Aircraft Powertrain Repairer
68D20 Aircraft Powertrain Repairer

References:
Appendix E

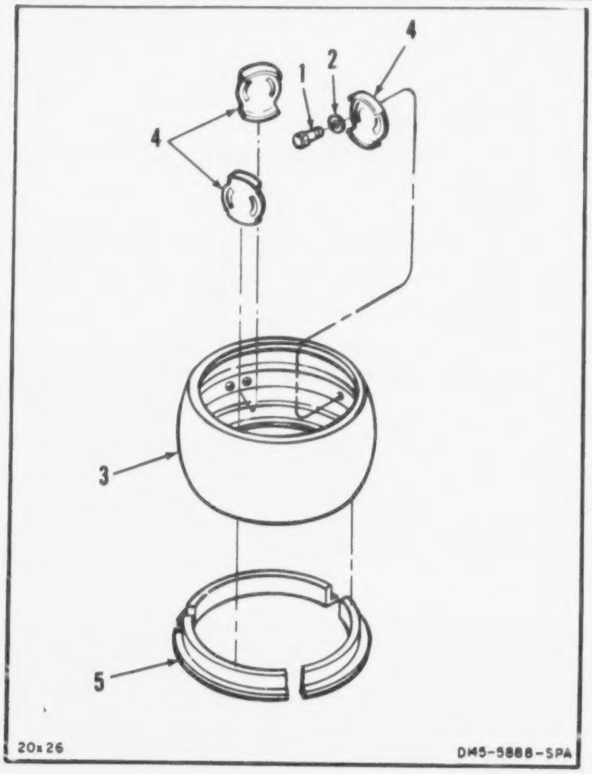
Equipment Condition:
Off Helicopter Task
Swashplate Ball Spherical Bearing Removed (Task 5-122)


UPPER SLIDING SLEEVE BEARING
BALL SPHERICAL BEARING
LOWER SLIDING SLEEVE BEARING
20x26
DI45-5887-SPA

NOTE

Procedure is same to remove forward and aft swashplate sliding sleeve bearings.

1. Remove lockwire from six screws (1). Remove screws and washers (2) from ball spherical bearing (3). **Remove three retainers (4).**
2. **Press out three upper sliding sleeve bearing segments (5)** from spherical bearing (3). Use arbor press and adapter (Appx E).


4
1
2
4
3
5
20x26
DH5-5888-SPA

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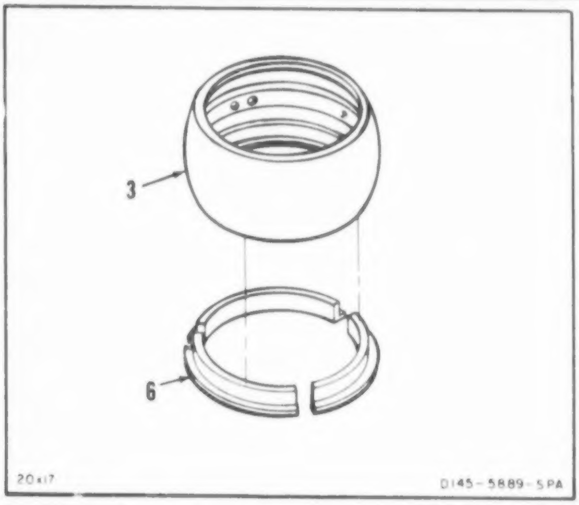
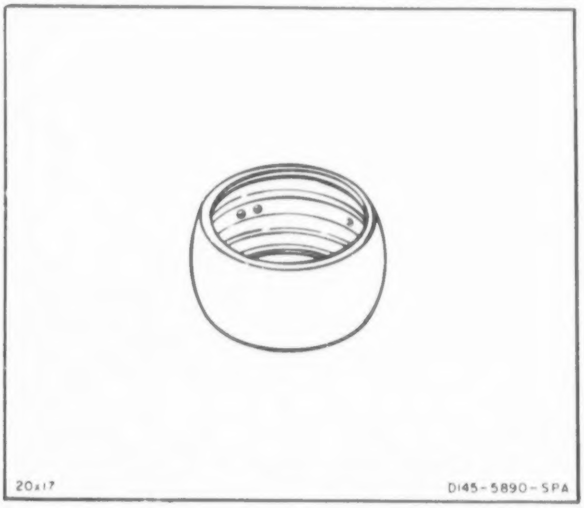
5-123 REMOVE SWASHPLATE SLIDING SLEEVE BEARINGS (AVIM) (Continued) 5-123

3. Turn ball spherical bearing (3) over and **press out three lower sleeve bearing segments (6).** Use arbor press and adapter.


3
6
20x17
D145-5889-5PA

FOLLOW-ON MAINTENANCE:

None


20x17
D145-5890-5PA

END OF TASK

5-123.1 INSPECT AND REPAIR BALL SPHERICAL BEARING 5-123.1

INITIAL SETUP

Applicable Configurations:

All

Tools:

Dial Indicating Gage 643J

Materials:

Naphtha (E245)
Emery Cloth (E123) or
Abrasive Paper (E13)
Crocus Cloth (E122)
Cloths (E120)
Gauze Sponges (E184)
Gloves (E186)
Acetic Acid (E21)
Alodine Powder (E65)

Personnel Required:

Aircraft Powertrain Repairer
Inspector

References:

TM 55-1500-335-23
MIL-C-5541

Equipment Condition:

Off Helicopter Task

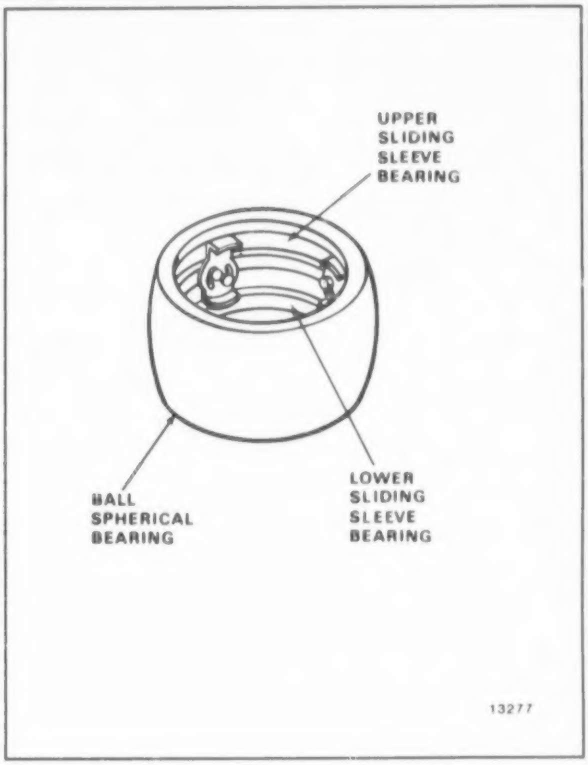
General Safety Instructions:

WARNING

Naphtha (E245) is combustible and toxic. It can irritate skin and cause burns. Use only with adequate ventilation, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

CAUTION

Do not wear photogray glasses when fluorescent inspecting. They reduce ability to see cracks.



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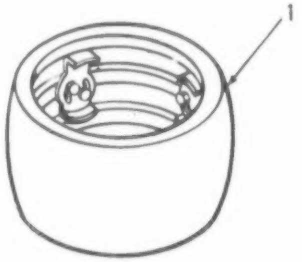
5-123.1 INSPECT AND REPAIR BALL SPHERICAL BEARING (Continued) 5-123.1



1. **Clean** oil and grease from **surface of bearing (1).** Use naphtha (E245) and clean cloths (E120). Wear gloves (E186).
2. **Inspect surface of bearing (1)** for nicks, scratches, and minor pitting or corrosion of coating. Observe the following definitions:
   a. *Nick* — A surface identation with a sharp crease at the bottom. Surface finish is not broken. Caused by pressure or impact from a hard object with a sharp edge.
   b. *Scratch* — A light, narrow mark on the surface. Surface finish is broken, but not removed. Caused by a hard, sharp particle moving across the surface.
   c. *Pit* — A small irregular cavity where material is removed from the surface. Usually caused by corrosion. Pits are usually dark in appearance.
   d. *Corrosion* — A broken or pitted surface, discolored around the edge. Corrosion is caused by chemical action.
3. Note extent and location of damage:

NOTE

Limits in this step refer to depth of damage after rework.

   a. **Depth of damage on bearing surface (1) shall not be more than 0.020 inch.**
   b. **Damage shall not extend to edge of bearing surface.**
   c. **Sum of length plus width of any one damaged area shall not be more than 1-1/4 inches.**
   d. **Distance between two damaged areas shall not be less than half the length of the larger area.**

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5-123.1 INSPECT AND REPAIR BALL SPHERICAL BEARING (Continued) 5-123.1

e. **There shall be no more than 20 damaged areas in any 3/4-inch wide band (2) around surface of bearing (1). There shall be no more than five damaged areas in any quarter-section of the band. The total of length plus width of all five areas shall not be more than 5-1/2 inches.**

f. **There shall be no more than 75 damaged areas over entire surface.**

4. **Fluorescent inspect** damaged area to check for cracks. (Refer to TM 55-1500-335-23.) **There shall be no cracks.**
5. **Blend out damage** with emery cloth (E123) or abrasive paper (E13). Observe limits of step 3.
6. **Smooth blended area** with crocus cloth (E122). Do not leave any sharp edges.
7. **Acid-etch reworked area** as follows:

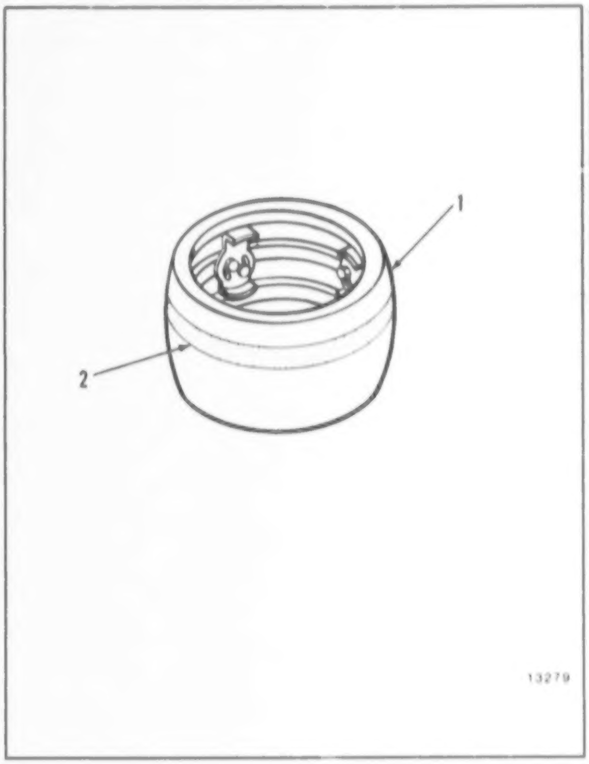
WARNING

Acetic acid (E21) is combustible and toxic. It can irritate skin and cause burns. Avoid inhaling. Use only with adequate ventilation, away from open flame. Avoid contact with skin, eyes, or clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

a. **Prepare solution of 3 parts acetic acid (E21) to 7 parts water.** Wear gloves (E186) and goggles.

b. **Swab area with solution for 2 minutes.** Use gauze sponges (E184).

c. **Rinse** area with cold water.



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5-123.1 INSPECT AND REPAIR BALL SPHERICAL BEARING (Continued) 5-123.1

8. **Fluorescent inspect** reworked area to check for cracks (TM 55-1500-335-23). **There shall be no cracks.**
9. Apply surface treatment to reworked area as follows:

   a. Clean area with naphtha (E245) and clean cloths (E120). Let area air dry. Wear gloves (E186).

WARNING

Alodine powder (E65) is an oxidizer. Discard cloths which contain this material in a separate container. If discarded with cloths contaminated with acetone, MEK, or other organic solvents, combustion can result. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

   b. **Swab solution of alodine powder (E65) in water (MIL-C-5541) on area. Swab for 2 to 5 minutes.** Use gauze sponges (E184). Wear gloves (E186).

   c. **Rinse** area with cold water. Let air dry.

INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-124 INSTALL SWASHPLATE SLIDING SLEEVE BEARING (AVIM) 5-124

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit,
NSN 5180-00-003-5267
Sliding Bearing Locating Fixture (T110)
Torque Wrench, 5 to 50 Inch-Pounds
Vernier Calipers
Soft Aluminum Scraper

Materials:

Dry Cleaning Solvent (E162)
Methyl-Ethyl-Ketone (E244)
Scrim Cloth (E326)
Adhesive (E43)
Cloth (E120)
Lockwire (E231)
Gloves (E186)

Personnel Required:

Aircraft Powertrain Repairer (2)
Inspector

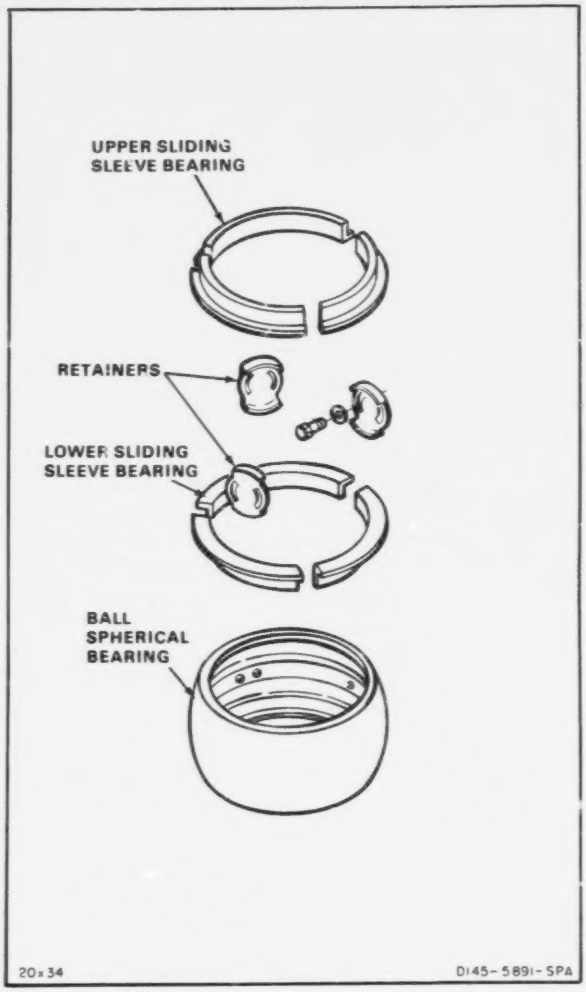
References:

TM 55-1520-240-23P

General Safety Instructions:

WARNING

Methyl-ethyl-ketone (E244) and dry cleaning solvent (E162) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.


UPPER SLIDING SLEEVE BEARING
RETAINERS
LOWER SLIDING SLEEVE BEARING
BALL SPHERICAL BEARING
20x34
D145-5891-SPA

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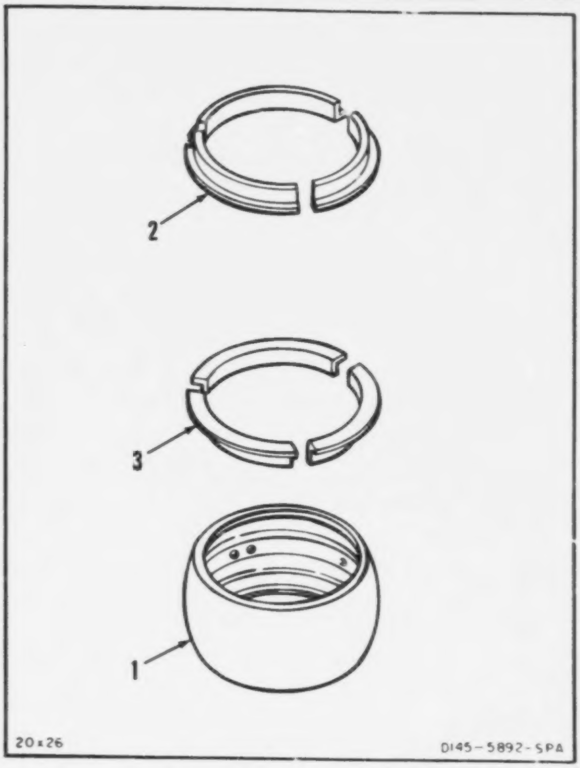
5-124 INSTALL SWASHPLATE SLIDING SLEEVE BEARING (AVIM) (Continued) 5-124

NOTE

Procedure is same to install forward and aft swashplate sliding sleeve bearings.

1. Clean inside of ball spherical bearing (1). Use cloth (E120) damp with dry cleaning solvent (E162). Wear gloves (E186).
2. Clean mating surfaces of six sliding sleeve bearing segments (2 and 3) and spherical bearing (1). Use cloth (E120) damp with methyl-ethyl-ketone (E244).
3. **Scrape** any **scrim cloth** from inside of spherical bearing (1). Use soft aluminum scraper.

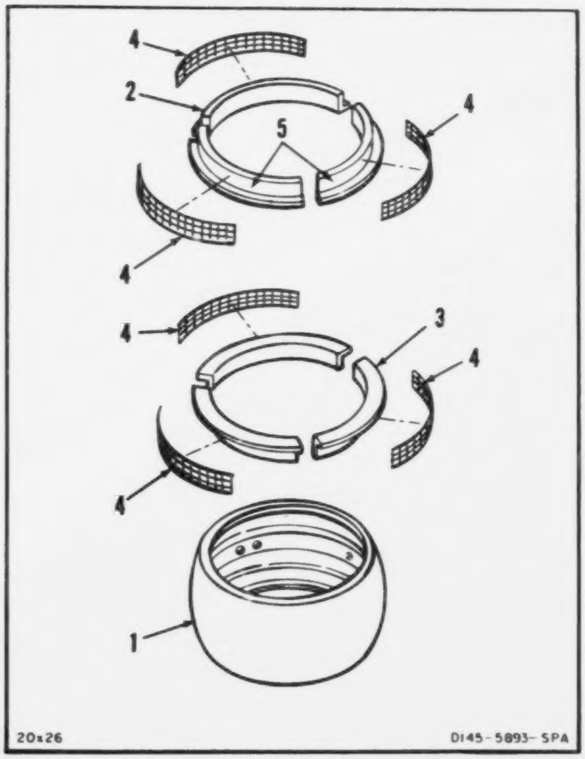


4. **Cut six strips of scrim cloth (E326) (4)** to size of curved mating surfaces of sleeve bearing segments (2 and 3).

NOTE

Pot life of mixed adhesive (E43) is 2 hours at 72°F (22°C).

5. **Apply** even coat of **adhesive (E43)** to mating surfaces of spherical bearing (1) and sleeve bearing segments (2 and 3). Wear gloves (E186).
6. **Press scrim cloth (E326) (4) into adhesive** on curved outside surfaces (5) of sleeve bearing segments (2 and 3) by hand.



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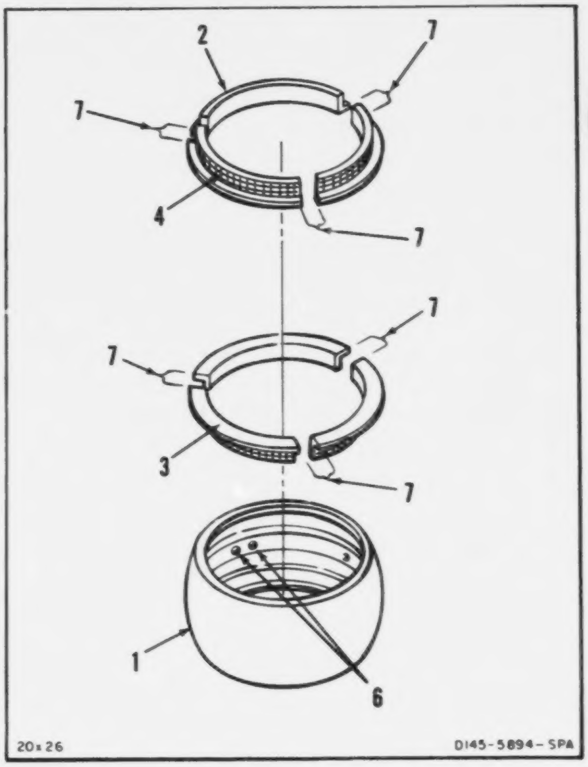
5-124 INSTALL SWASHPLATE SLIDING SLEEVE BEARING (AVIM) (Continued) 5-124



7. **Apply** even coat of **adhesive over scrim cloth (E326) (4).** Do not allow bubbles or lumps to form. Wear gloves (E186).

8. **Install sleeve bearing segments (2 and 3)** as follows:

   a. Position three upper segments (2) and three lower segments (3) in ball spherical bearing (1). Align center of each segment between holes (6). Keep gaps (7) between segments equal within 0.050-inch.

NOTE

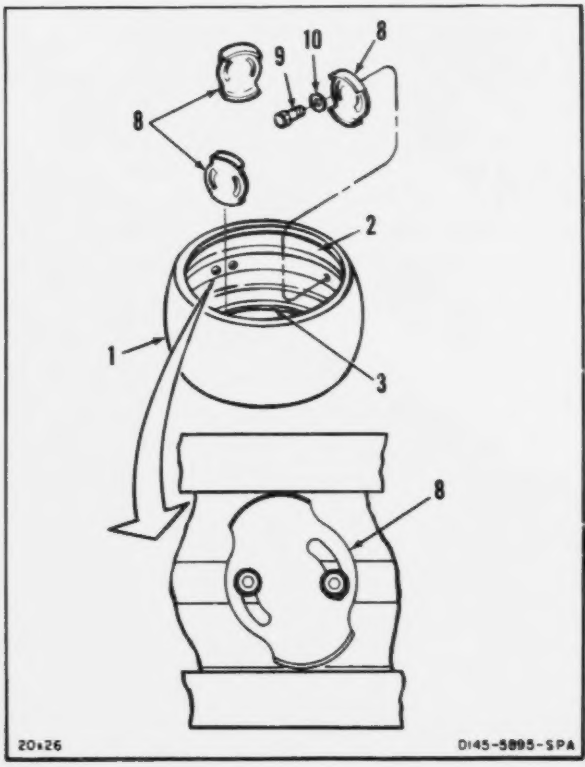
Segments must seat firmly against shoulder of ball.

   b. Apply pressure to seat each segment (2 and 3). Squeeze out excess adhesive. Make sure segments do not move.

   c. Wipe excess adhesive from bearing (1). Use cloth (E120) damp with methyl-ethyl-ketone (E244). Wear gloves (E186).

   d. Position three retainers (8) in bearing (1). Install two screws (9) and washers (10) loosely. Turn retainers clockwise until retainers hold segments (2 and 3) securely in position.

   e. **Torque screws (9) to 15 inch-pounds.** Do not lockwire screws at this time.



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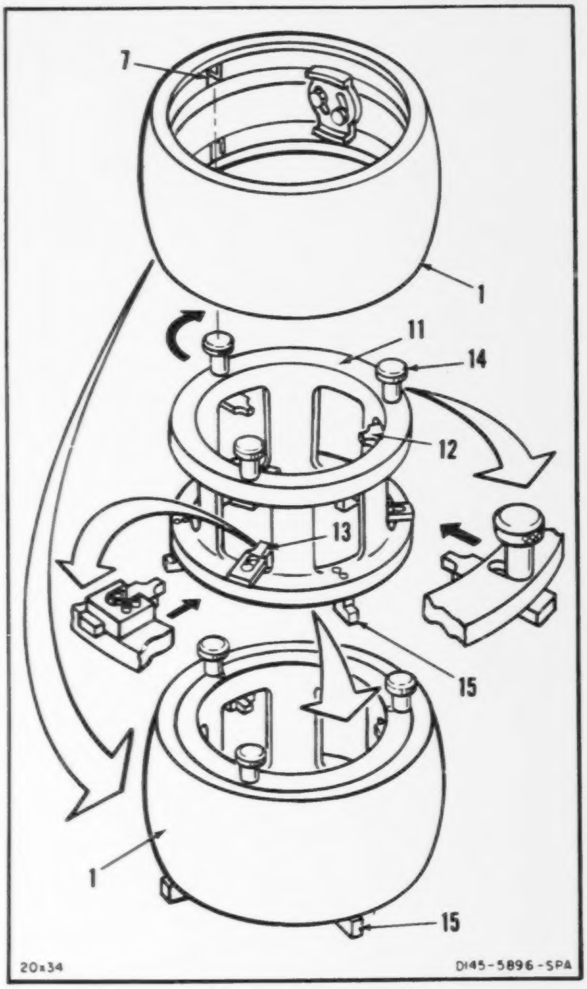
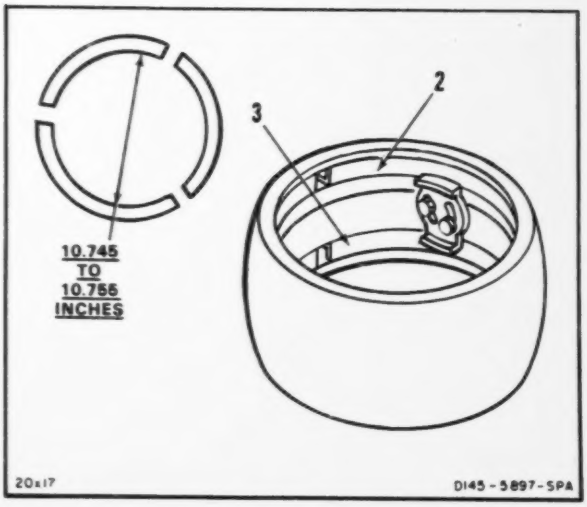
5-124 INSTALL SWASHPLATE SLIDING SLEEVE BEARING (AVIM) (Continued) 5-124

9. **Install bearing (1) on locating fixture (T110) (11)** as follows:
   a. Rest fixture (T110) (11) on flat surface.
   b. Pull three clamps (12) and three supports (13) toward center.
   c. Align spherical bearing (1) so three gaps (7) center on three handknobs (14). Rest bearing on three feet (15) of fixture (T110) (11).
   d. Push three supports (13) and three clamps (12) outboard under slots. Turn three handknobs (14) clockwise to tighten clamps.
   e. Remove adhesive squeeze out from spherical bearing (1). Use cloth (E120) damp with dry cleaning solvent (E162). Wear gloves (E186).
   f. Allow adhesive to cure 24 hours.
   g. Loosen handknobs (14). Pull clamps (12) and supports (13) inward until clear of bearing (1).
   h. Remove bearing (1) from fixture (T110) (11).



10. **Check that location and spacing of six segments (2 and 3)** is as described in step 8.a.
11. **Check inside diameter across segments (2 and 3).** Inside diameter shall be 10.745 to 10.755 inches.



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5-124 INSTALL SWASHPLATE SLIDING SLEEVE BEARING (AVIM) (Continued) 5-124

12. **Check installation of three retainers (8)** as follows:

    a. Loosen six screws (9).

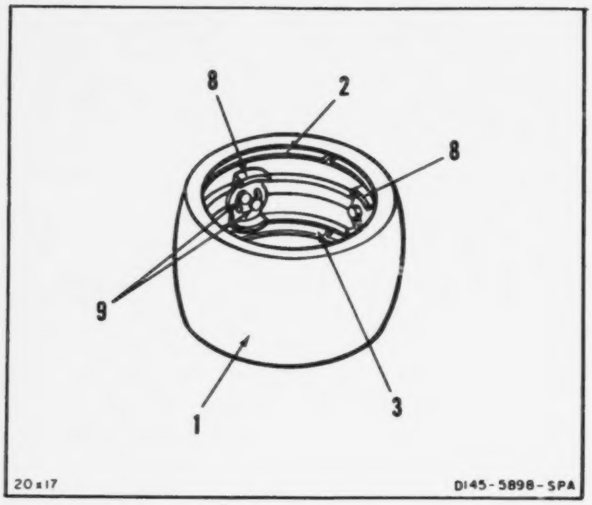
    b. Hold each retainer (8) firmly against segments (2 and 3).

    CAUTION

    Do not turn lockwire ends inboard of bolt heads. Make sure retainers are not inboard of sleeve bearing surface. Contact with lockwire or retainer will damage slider shaft.

    c. **Torque screws (9) to 15 inch-pounds.** Lockwire screws. Use lockwire (E231). Tuck end under crosswire.

13. Clean adhesive from bearing (1). Use cloth (E120) damp with methyl-ethyl-ketone (E244). Use soft aluminum scraper, if needed. Wear gloves (E186).



INSPECT

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-125 INSTALL SWASHPLATE BALL SPHERICAL BEARING 5-125

INITIAL SETUP

Applicable Configurations:

All

Tools:

Powertrain Repairer's Tool Kit,
NSN 5180-00-003-5267
Mallet
Phenolic Drift, 1/2 Inch x 2 Inches x 10 Inches
Wood Blocks (9), 2 Inches x 4 Inches
x 10 Inches Each
Goggles
Torque Wrench, 0 to 150 Inch-Pounds
Torque Wrench, 100 to 750 Inch-Pounds

Materials:

Lockwire (E231)
Lockwire (E233)
Zinc Chromate Primer (E291)
Gloves (E186)

Personnel Required:

Aircraft Powertrain Repairer (2)
Inspector

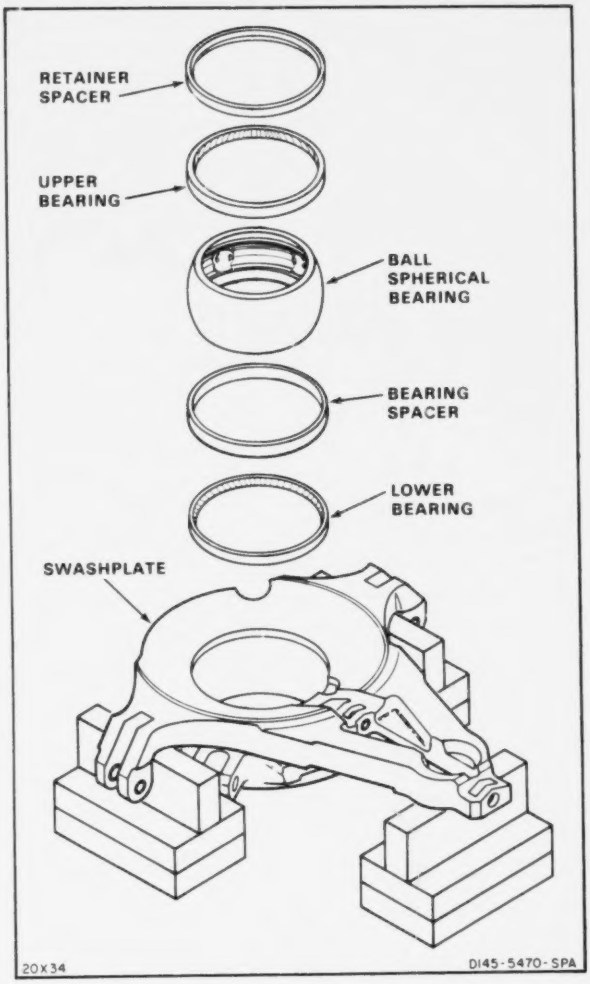
References:

TM 55-1520-240-23P

General Safety Instructions:

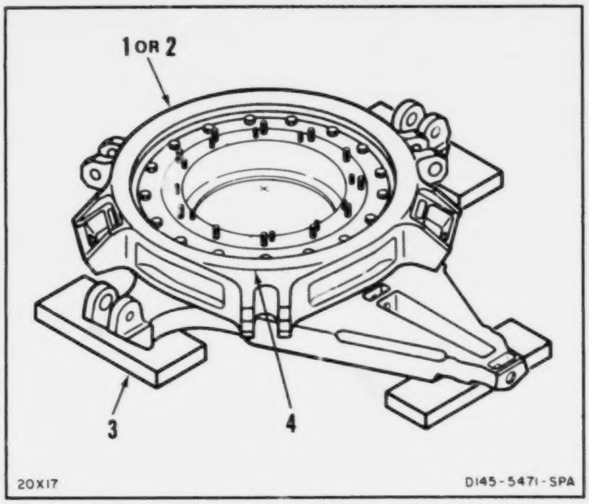
WARNING

Zinc chromate primer (E291) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.


RETAINER SPACER
UPPER BEARING
BALL SPHERICAL BEARING
BEARING SPACER
LOWER BEARING
SWASHPLATE
20X34
D145-5470-SPA

GO TO NEXT PAGE

5-125 INSTALL SWASHPLATE BALL SPHERICAL BEARING (Continued) 5-125

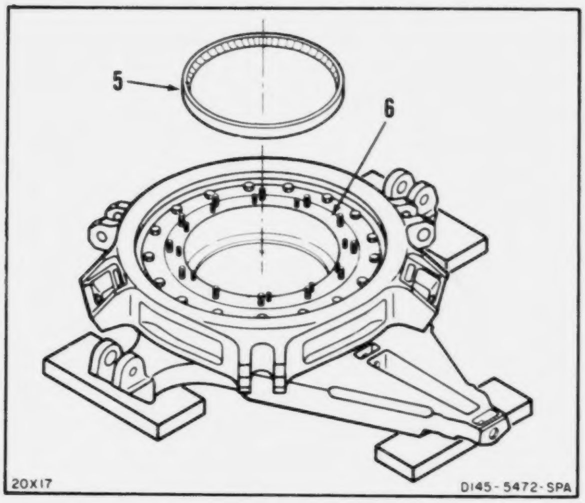


20X17 D145-5471-SPA

NOTE

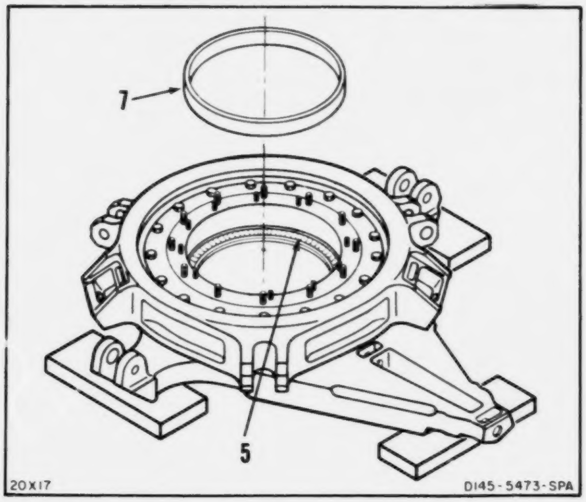
- Procedure is similar to install forward or aft swashplate ball spherical bearing. Differences are noted in text.
- Lower bearing, bearing spacer, and upper bearing are matched set. Keep parts together.
- If removed bearings and spacers are being reinstalled, align matchmarks with matchmark on stationary ring.

1. Position swashplate (1 or 2) on blocks (3), rotating ring (4) up.



20X17 D145-5472-SPA

2. **Tap lower bearing (5), thickest edge down, into stationary ring (6).** Use phenolic drift.



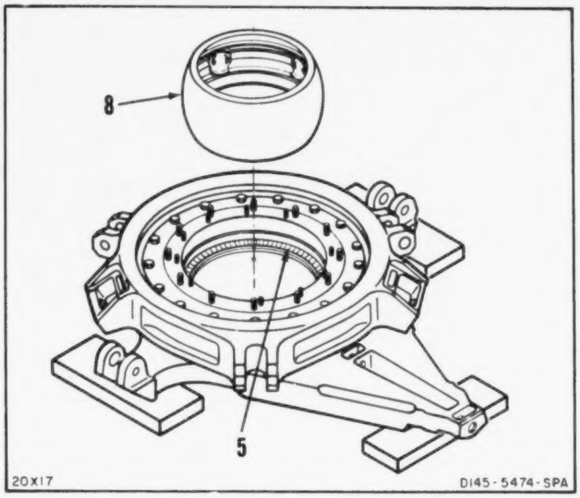
20X17 D145-5473-SPA

3. **Tap bearing spacer (7) into position** against lower bearing (5) if necessary. Use phenolic drift.

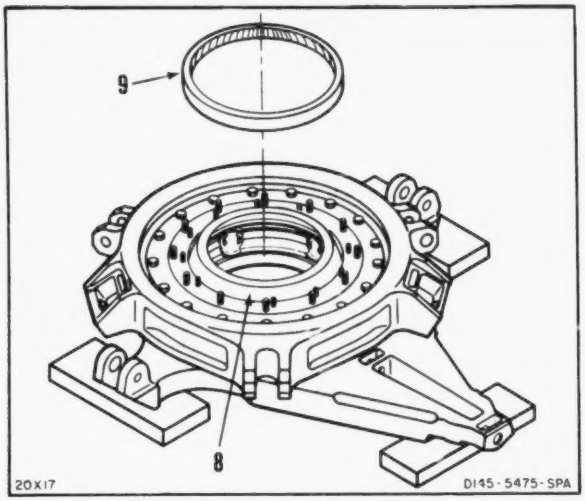
GO TO NEXT PAGE

5-125 INSTALL SWASHPLATE BALL SPHERICAL BEARING (Continued) 5-125

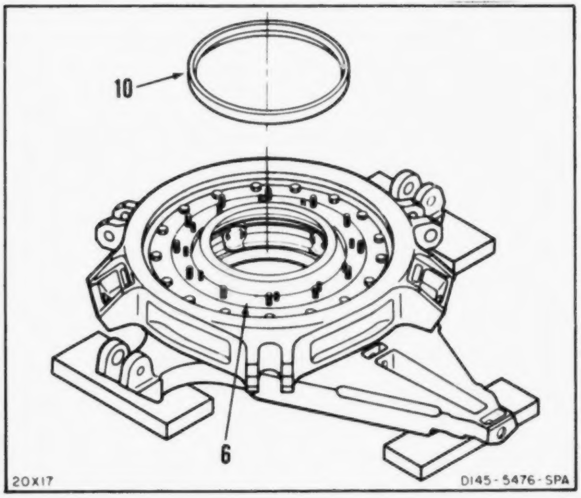
4. **Position spherical bearing (8)** on lower bearing (5).


8
5
20X17
D145-5474-SPA

5. **Tap upper bearing (9), thickest edge up, into position** over spherical bearing (8) if necessary. Use phenolic drift.


9
8
20X17
D145-5475-SPA

6. **Tap retaining spacer (10) into stationary ring (6) if necessary.** Use phenolic drift.


10
6
20X17
D145-5476-SPA

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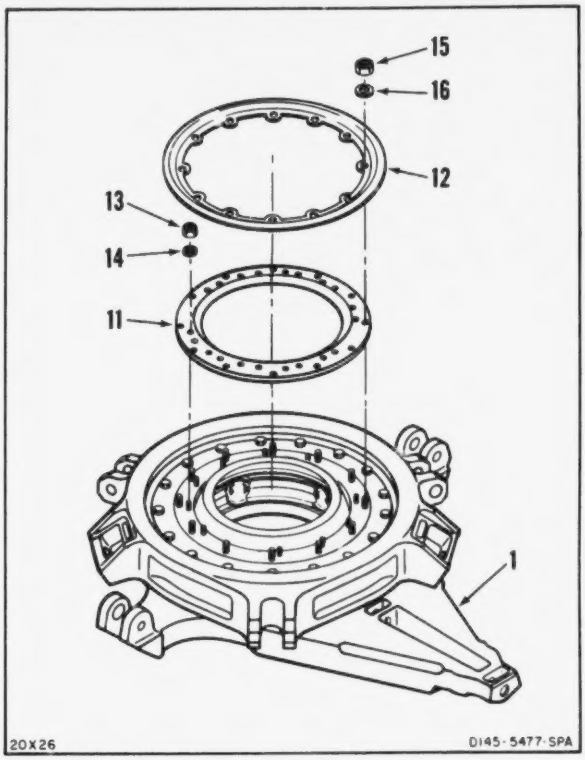
5-125 INSTALL SWASHPLATE BALL SPHERICAL BEARING (Continued) 5-125

7. **For forward swashplate (1) only, install upper retainer (11) and seal (12)** as follows:

   a. Install upper retainer (11). Install 10 nuts (13) and washers (14). **Torque 10 nuts to 85 inch-pounds.**

   b. Install seal (12). Install 12 nuts (15) and washers (16). **Torque 12 nuts to 175 inch-pounds.**

INSPECT



8. **For aft swashplate (2) only, install upper retainer (17) and seal (18)** as follows:

   a. Position upper retainer (17) on stationary ring (6).

   b. Coat 10 bolts (19) with zinc chromate primer (E291). Wear gloves (E186).

   c. Install 10 bolts (19) and washers (20).

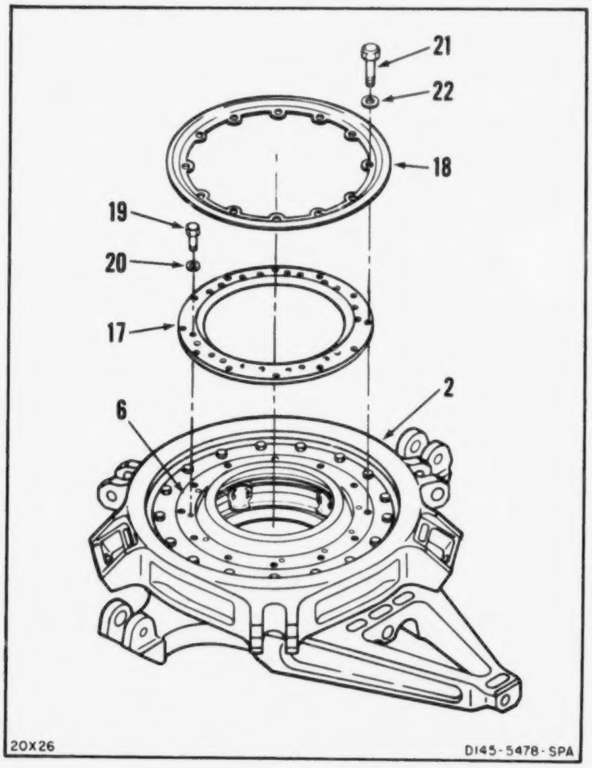
   d. **Torque 10 bolts (19) to 105 inch-pounds.** Lockwire bolts. Use lockwire (E233).

   e. Position seal (18) on stationary ring (6).

   f. Coat 12 bolts (21) with zinc chromate primer (E291). Wear gloves (E186).

   g. Install 12 bolts (21) and washers (22).

   h. **Torque12 bolts (21) to 210 inch-pounds.** Lockwire bolts. Use lockwire (E231).



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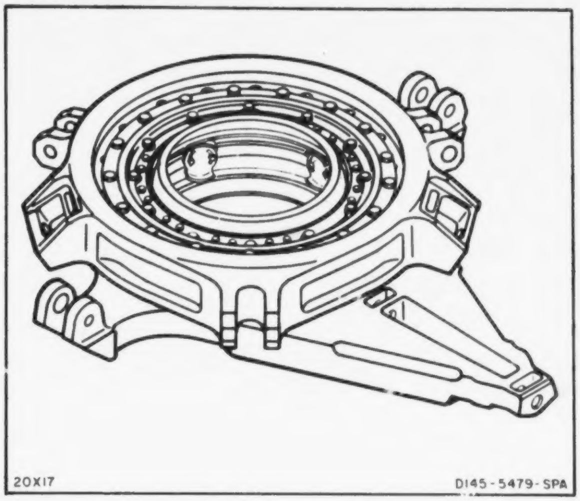
5-125 INSTALL SWASHPLATE BALL SPHERICAL BEARING (Continued) 5-125

INSPECT



FOLLOW-ON MAINTENANCE:

Check friction of ball spherical bearing (Task 5-114).

END OF TASK

5-126 INSPECT FORWARD SWASHPLATE STATIONARY RING 5-126

INITIAL SETUP

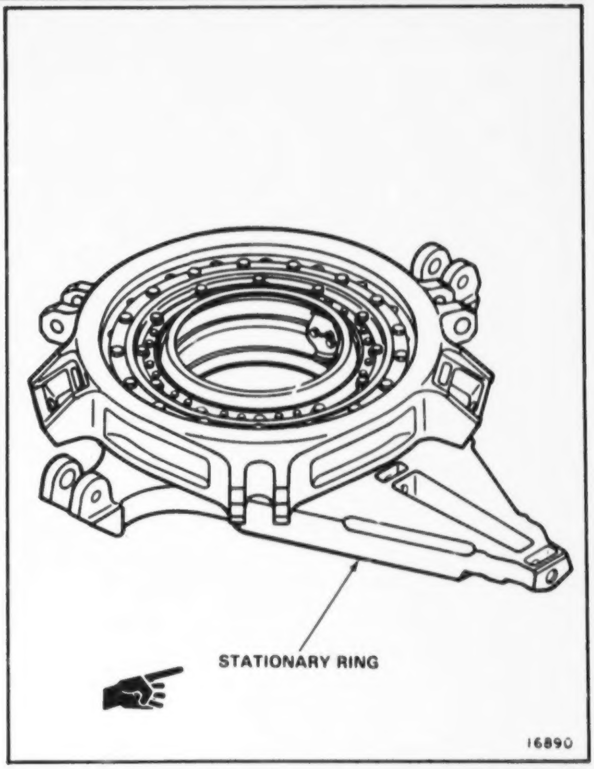
Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit, NSN 5180-00-323-5114

Materials:
None

Personnel Required:
Inspector

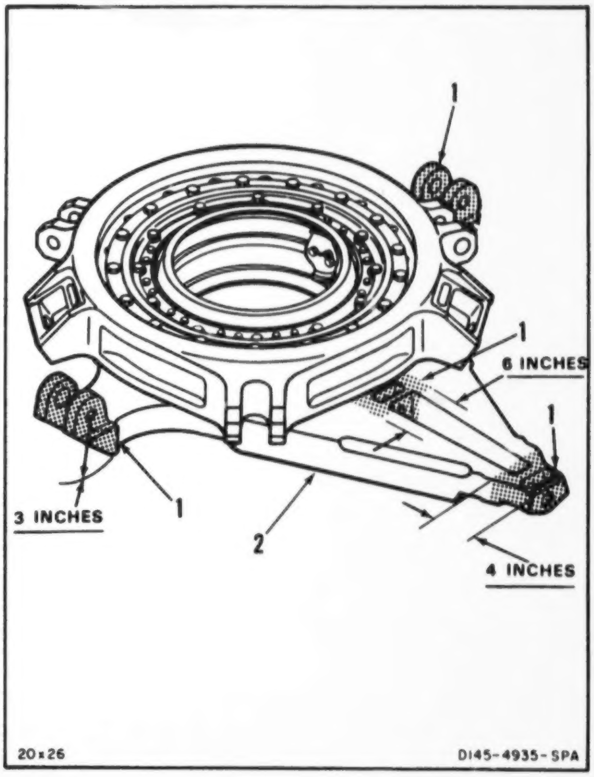
Equipment Condition:
Off Helicopter Task


STATIONARY RING
16890

1. **Check for nicks or scratches in critical areas (1) of stationary ring (2).** Repair damage up to 0.020 inch in depth (Task 5-127).
2. **Check for nicks or scratches in all other areas of stationary ring (2).** Damage up to 0.005 inch in depth shall be accepted without rework. Repair damage within 0.005 inch to 0.020 inch in depth (Task 5-127).

FOLLOW-ON MAINTENANCE:

None


1
1
6 INCHES
1
3 INCHES
1
2
4 INCHES
20x26
D145-4935-SPA

END OF TASK

5-126.1 REPLACE SWASHPLATE LOWER SEAL (AVIM) 5-126.1

INITIAL SETUP

Applicable Configurations:
All

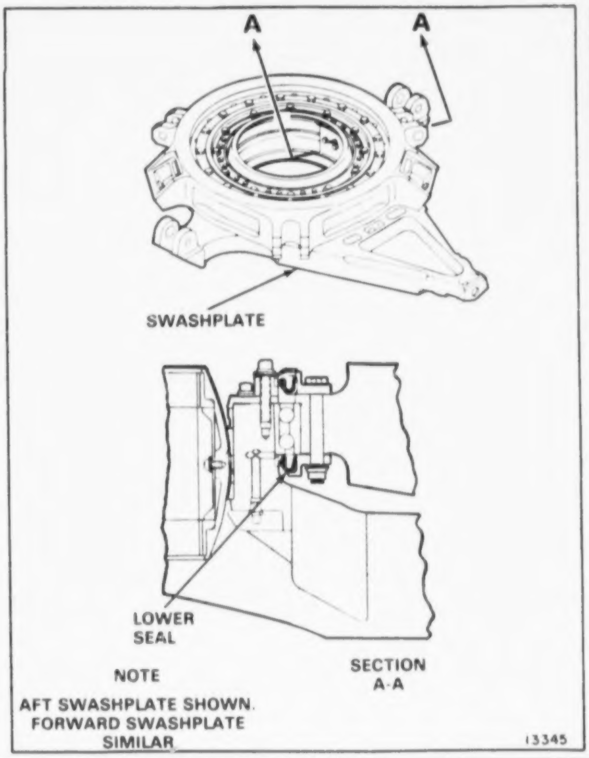
Tools:
Powertrain Repairer's Tool Kit, NSN 5180-00-003-5267
Phenolic Drift
Oven

Materials:
Dry Cleaning Solvent (E162)
Cloths (E120)
Grease (E190)

Personnel Required:
Aircraft Powertrain Repairer (2)

References:
Task 5-122
Task 5-125
TM 55-1520-240-23P

Equipment Condition:
Off Helicopter Task



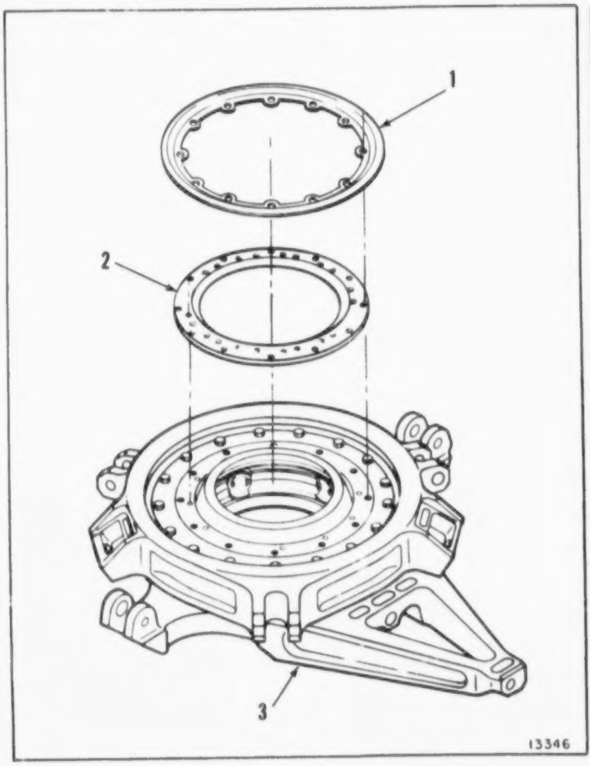
NOTE
AFT SWASHPLATE SHOWN. FORWARD SWASHPLATE SIMILAR

NOTE

Procedure is same to replace lower seal on forward or aft swashplate. Aft swashplate shown.

REMOVE SEAL

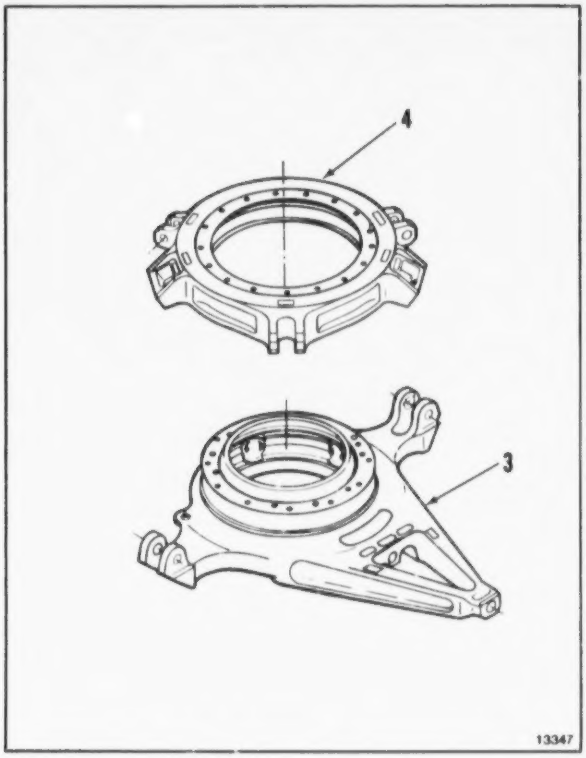
1. **Remove seal (1) and upper retainer (2)** from stationary ring assembly (3) (Task 5-122).



GO TO NEXT PAGE

5-126.1 REPLACE SWASHPLATE LOWER SEAL (AVIM) (Continued) 5-126.1

2. Carefully **lift rotating ring assembly (4)** from stationary ring (3). Use a mallet to separate the rings, if needed.

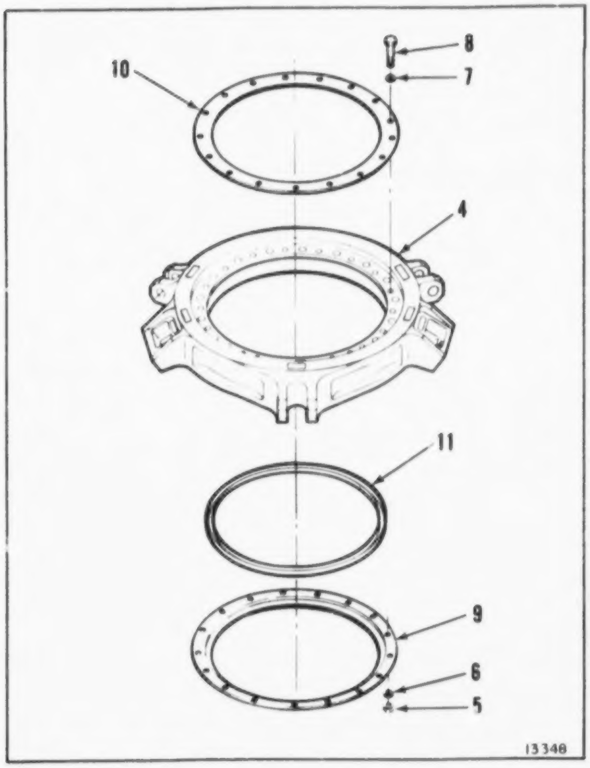


3. Remove nuts (5), washers (6 and 7), and bolts (8). **Remove lower seal retainer (9) and rotating grease seal (10)** from rotating ring (4).

CAUTION

Do not insert a screwdriver or other sharp tool between the seal and the retainer. Serious damage to the seal seating surface can result.

4. **Remove seal (11)** from lower seal retainer (9). Use a mallet and phenolic drift.



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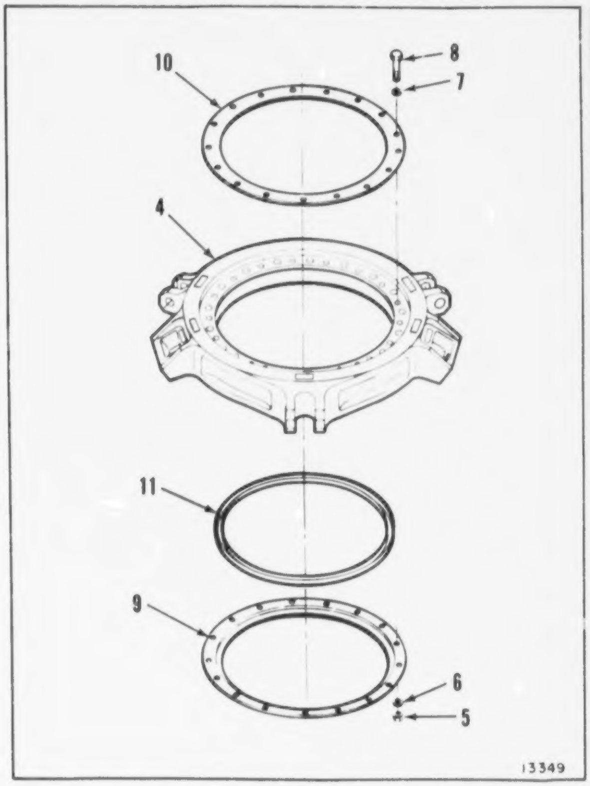
5-126.1 REPLACE SWASHPLATE LOWER SEAL (AVIM) (Continued) 5-126.1

INSTALL LOWER SEAL



WARNING

Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

5. **Clean mating surfaces** of seal (11), retainer (9), grease seal (10) and rotating ring (4). Use dry cleaning solvent (E162) and clean cloths (E120). Wear gloves (E186). Allow solvent to dry.

WARNING

Wear Kevlar gloves (E187) when handling heated parts.

6. **Heat retainer (9)** to 170° to 190°F (77° to 88°C). Use an oven.
7. **Install seal (11) in retainer (9).** Use a phenolic block and mallet.

WARNING

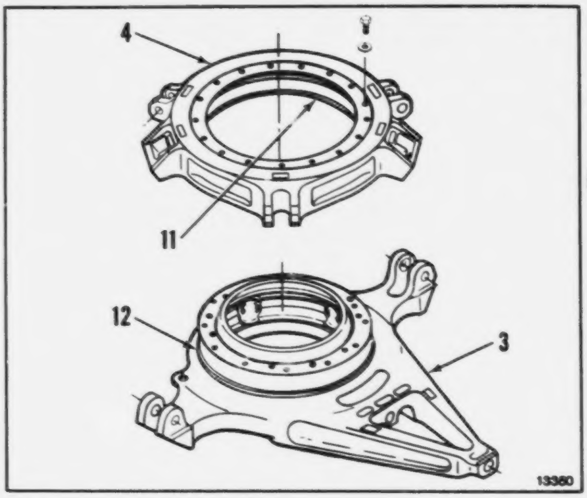
Zinc chromate primer (E291) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

8. **Install grease seal (10)** on rotating ring (4). **Install bolts (8),** wet with zinc chromate primer (E291) and washers (7).
9. **Install retainer (9),** with seal (11), over bolts (8). Install washers (6) and nuts (5).
10. **Tighten bolts (8) evenly to 285 inch-pounds above friction torque.**

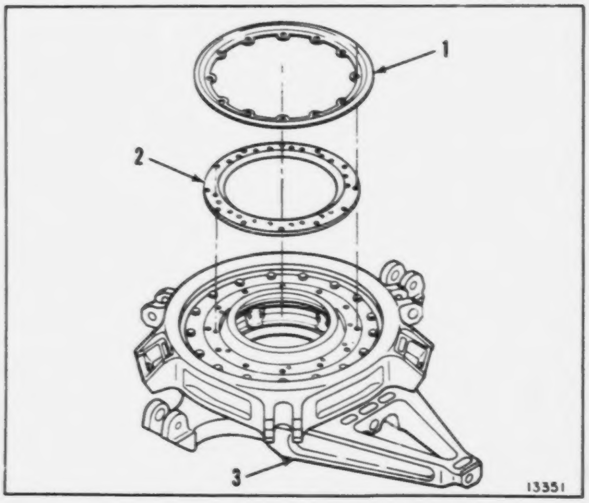
GO TO NEXT PAGE

5-126.1 REPLACE SWASHPLATE LOWER SEAL (AVIM) (Continued) 5-126.1

11. Coat lip of seal (11) and running surface (12) on stationary ring (3) with grease (E190).
12. Install rotating ring assembly (4) on stationary ring (3). Use a mallet, if needed.



13. **Install upper retainer (2) and seal (1)** on stationary ring (3) (Task 5-125).



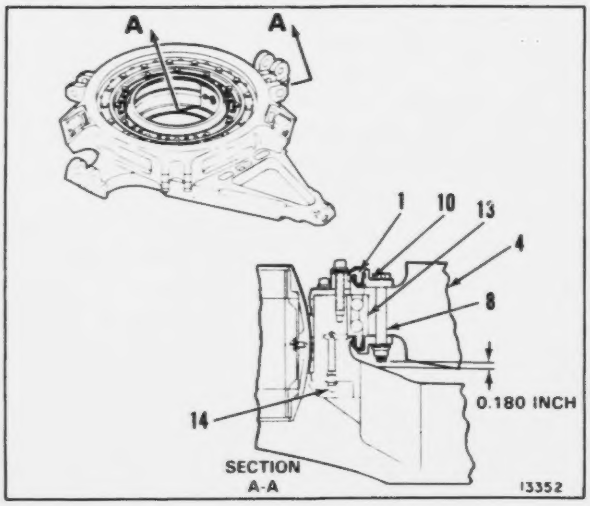
CAUTION

A bolt that is too long can damage the stationary ring.

14. **Check clearance between end of bolt (8) and stationary ring (3).** Clearance shall be 0.180 inch.
15. **Lubricate bearing (13)** through fitting (14). Use grease (E190). Turn rotating ring (4) while greasing until a fillet of grease appears between grease seals (1 and 10).

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-127 REPAIR FORWARD SWASHPLATE STATIONARY RING (AVIM) 5-127

INITIAL SETUP

Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit, NSN 5180-00-323-5114

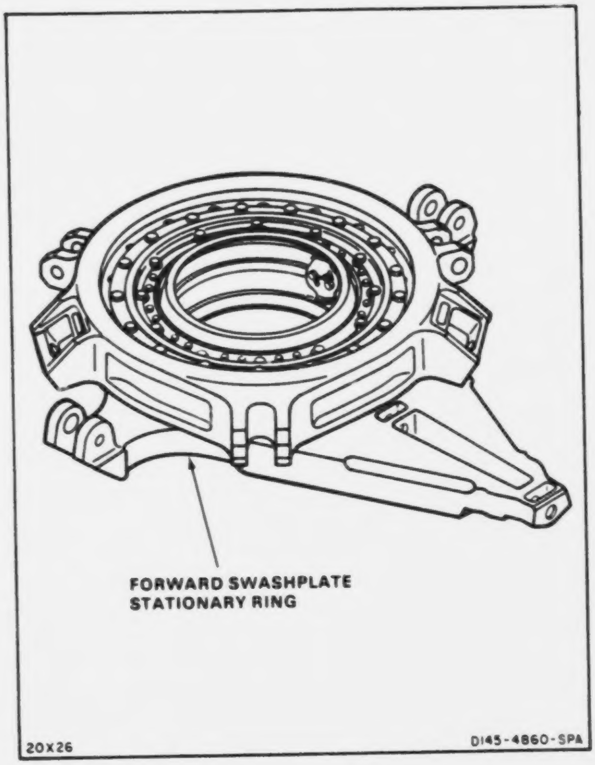
Materials:
- Abrasive Paper (E10)
- Alodine (E65)
- Wash Primer (E302)
- Zinc Chromate Primer (E291)
- Gloves (E186)

Personnel Required:
- 68D10 Aircraft Powertrain Repairer
- 68D20 Aircraft Powertrain Repairer
- 67U30 Inspector

References:
TM 55-1520-240-23P

Equipment Condition:
Off Helicopter Task

General Safety Instructions:



WARNING

Wash primer (E302) and zinc chromate primer (E291) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

GO TO NEXT PAGE

5-127 REPAIR FORWARD SWASHPLATE STATIONARY RING (AVIM) (Continued) 5-127

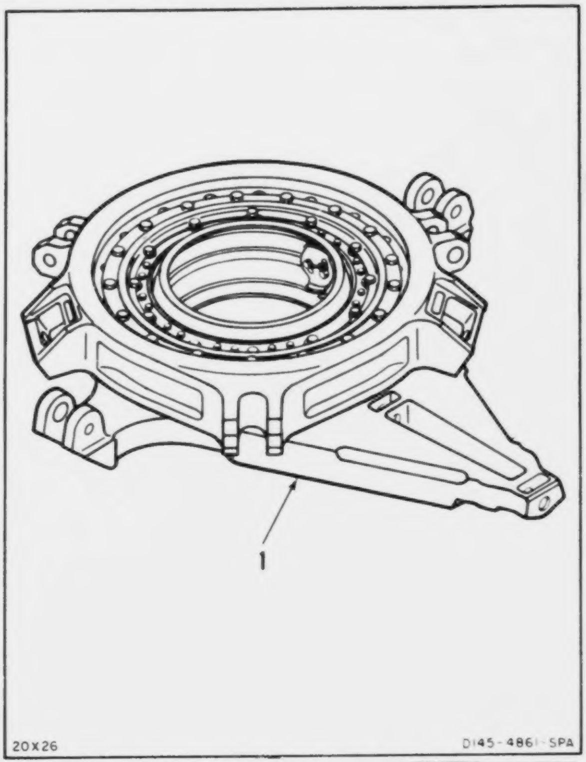
1. **Blend repair damage on stationary ring (1) 0.005 inch to 0.020 inch in depth.** Blend smooth with minimum blend radius of 1-inch. Use abrasive paper (E10). Rework shall not exceed 0.020 inch in depth.

INSPECT

WARNING

Alodine (E65) is an oxidizer. Discard cloths which contain this material in separate container. If discarded with cloths contaminated with acetone, mek, or other organic solvents, combustion can result. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

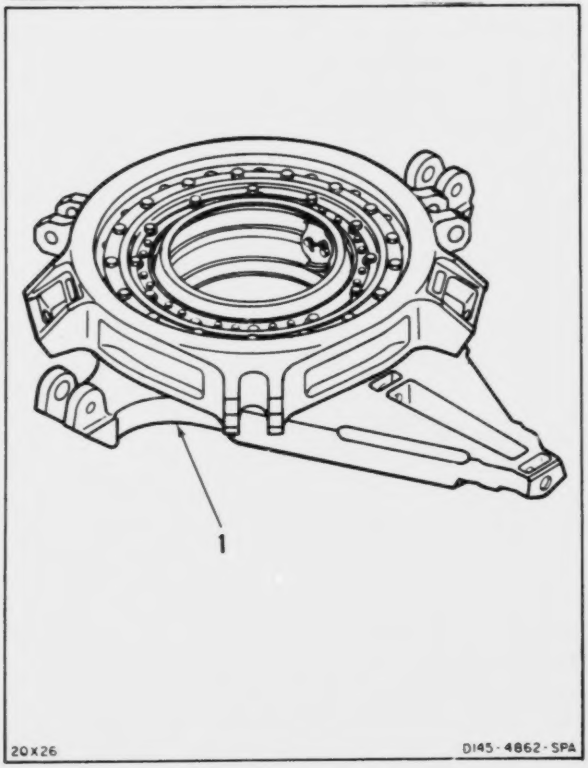
2. **Apply alodine (E65)** to repaired area of ring (1). Wear gloves (E186).



3. **Apply one coat of wash primer (E302)** to repaired area of ring (1). Allow primer to dry for 30 minutes.
4. **Apply one coat of zinc chromate primer (E291) to repaired area of ring (1).** Allow primer to dry for 30 minutes.

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-128 INSPECT AFT SWASHPLATE STATIONARY RING 5-128

INITIAL SETUP

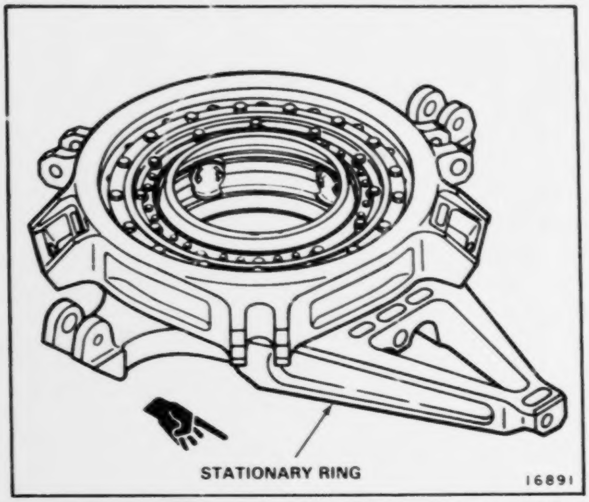
Applicable Configurations:
All

Tools:
Technical Inspection Tool Kit, NSN 5180-00-323-5114

Materials:
None

Personnel Required:
Inspector

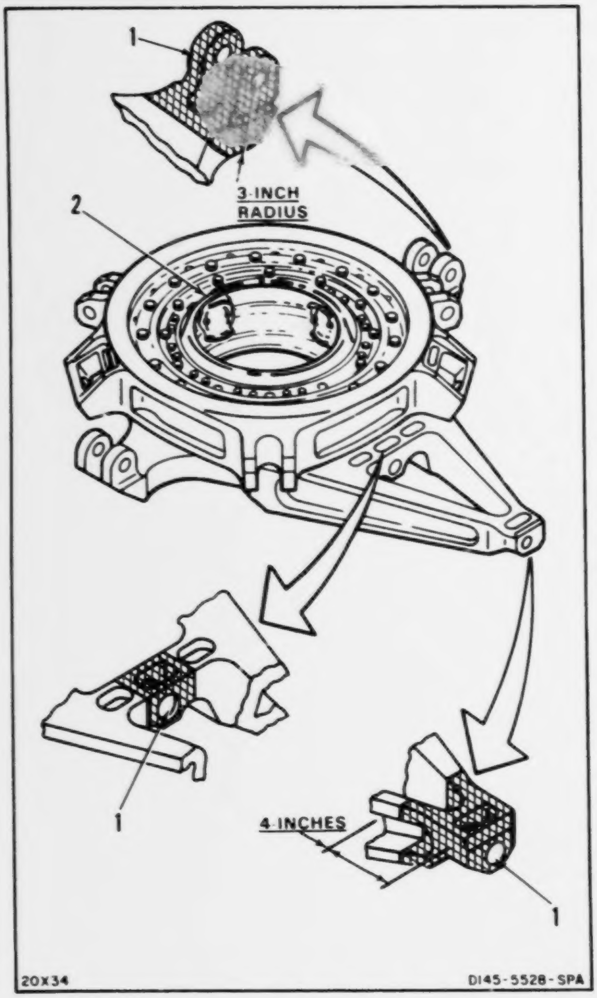
Equipment Condition:
Off Helicopter Task



1. **Check for nicks or scratches in critical areas (1) of stationary ring (2).** Damage less than 0.005 inch in depth shall be accepted without rework. Blend repair damage 0.005 inch to 0.040 inch in depth without exceeding 10 percent of material thickness (Task 5-129).
2. **Check for nicks or scratches in all other surfaces of stationary ring (2).** Damage less than 0.015 inch in depth shall be accepted without rework. Blend repair damage, 0.015 inch to 0.040 inch in depth without exceeding 10 percent of material thickness (Task 5-129).

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-129 REPAIR AFT SWASHPLATE STATIONARY RING (AVIM) 5-129

INITIAL SETUP

Applicable Configurations:
All

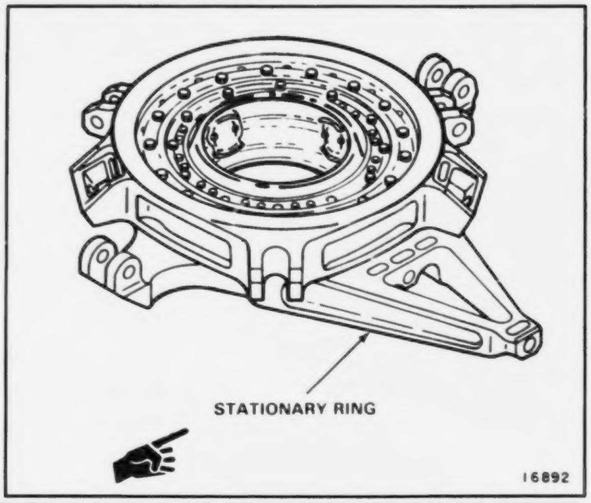
Tools:
Powertrain Repairer Tool Kit,
NSN 5180-00-003-5267

Materials:
Abrasive Paper (E10)
Zinc Chromate Primer (E291)

Personnel Required:
Aircraft Powertrain Repairer (2)
Inspector

References:
TM 55-1520-240-23P

Equipment Condition:
Off Helicopter Task



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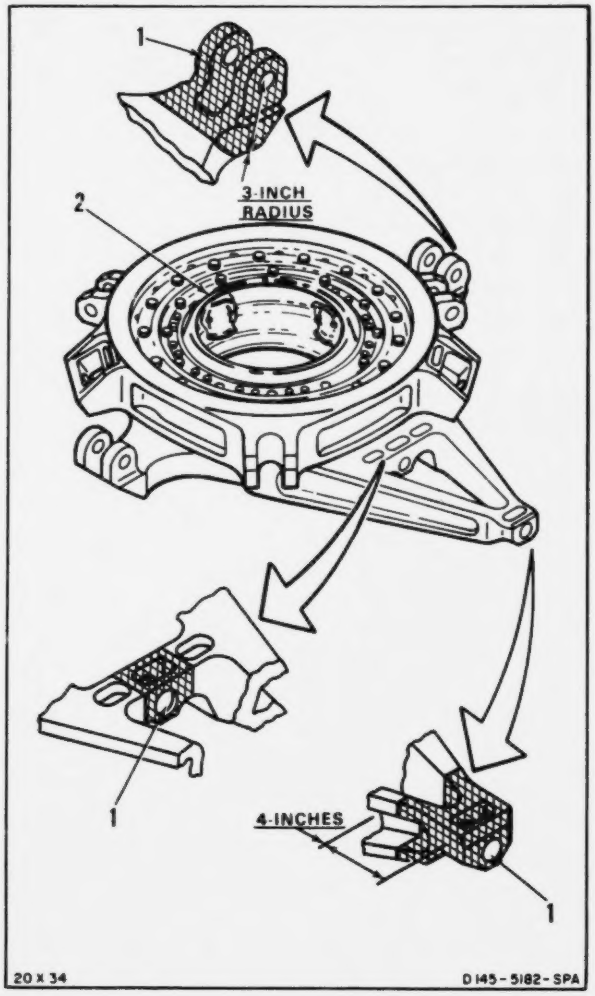
1. **Blend-repair damage in critical areas (1) of stationary ring (2) 0.005 inch to 0.040 inch in depth.** Use abrasive paper (E10). Make sure depth of repair does not exceed 10 percent of material thickness.

INSPECT

2. **Blend-repair damage in all other surfaces of stationary ring (2) 0.015 inch to 0.040 inch in depth** without exceeding 10 percent of material thickness. Use abrasive paper (E10).

INSPECT

3. Apply one coat of wash primer (E302) to repaired areas of stationary ring (2). Allow primer to dry for 30 minutes.



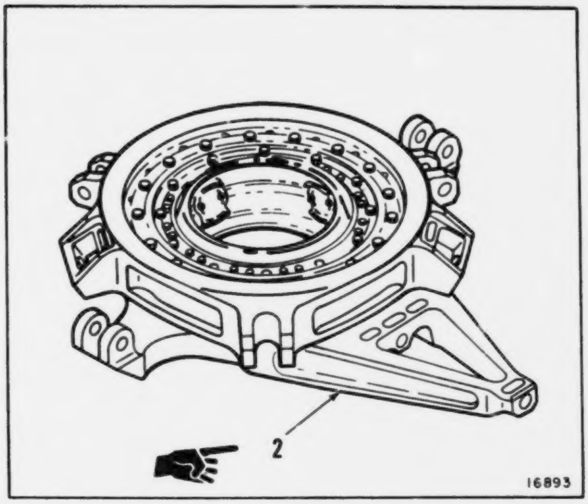
GO TO NEXT PAGE

5-129 REPAIR AFT SWASHPLATE STATIONARY RING (AVIM) (Continued) 5-129

WARNING

Zinc chromate primer (E291) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

4. **Apply three coats of zinc chromate primer (E291) to repaired areas** of stationary ring (2). Allow primer to dry for 30 minutes after each coat.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-130 PREPARE SWASHPLATE FOR STORAGE AND SHIPMENT 5-130

INITIAL SETUP

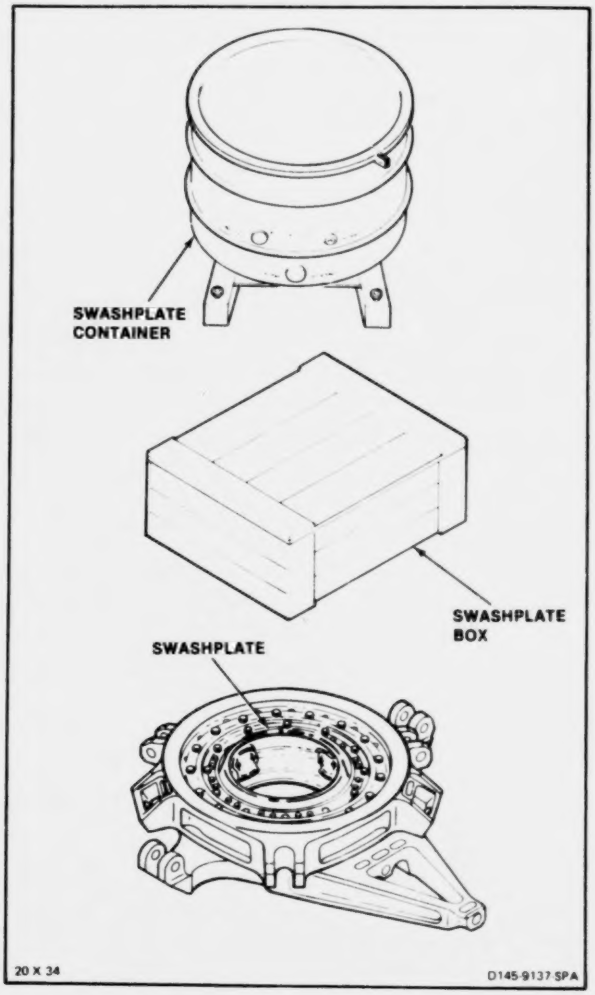
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Rotary-Wing Controls Sling (T14)
Hoist
Container (T107) or Wood Box

Materials:
Corrosion Preventive Compound (E153)
Barrier Material (E80)
Cushioning Material (E241)
Tape (E395)

Personnel Required:
Medium Helicopter Repairer

Equipment Condition:
Off Helicopter Task
Swashplate Cleaned (Task 5-118)
Swashplate Lubricated (Task 1-90)


SWASHPLATE CONTAINER
SWASHPLATE BOX
SWASHPLATE
20 X 34
D145-9137-SPA

GO TO NEXT PAGE

5-130 PREPARE SWASHPLATE FOR STORAGE AND SHIPMENT (Continued) 5-130

WARNING

Corrosion preventive compound (E153) is flammable and toxic. Avoid inhaling. Use only with adequate ventilation. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

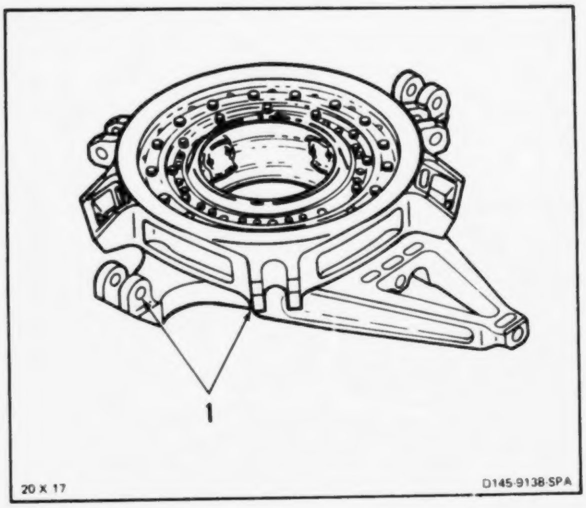
CAUTION

Do not allow corrosion preventive compound (E153) to contact dry-type bearings. Bearings can be damaged.

NOTE

Procedure is same to prepare forward or aft swashplate for storage and shipment.

1. **Apply corrosion preventive compound (E153) to unpainted surfaces of swashplate lugs (1).**



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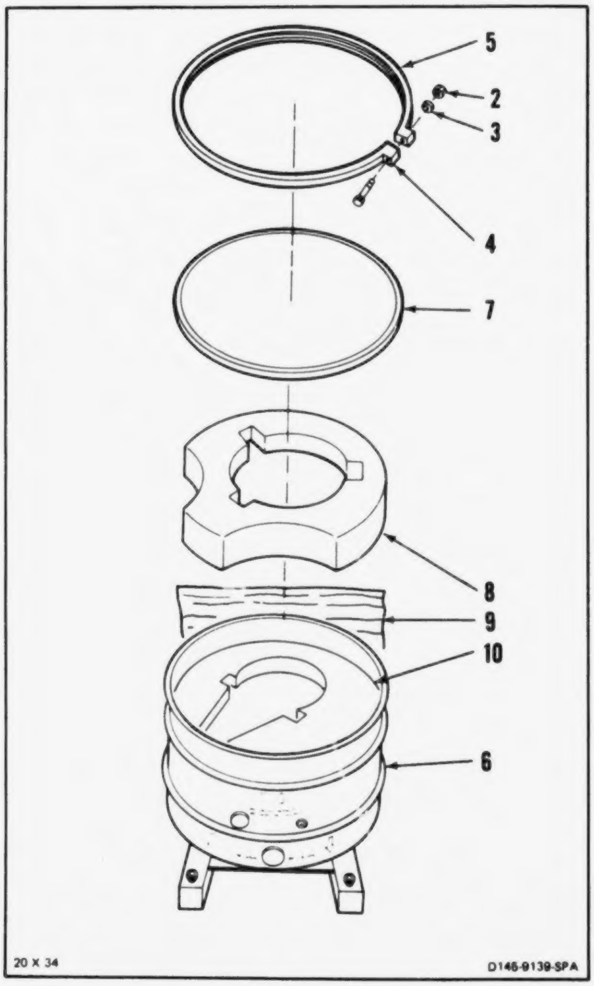
5-130 PREPARE SWASHPLATE FOR STORAGE AND SHIPMENT (Continued) 5-130

PACK SWASHPLATE IN CONTAINER (T107)

2. Remove nut (2), washer (3), bolt (4), and clamp ring (5) from container (T107) (6).
3. **Remove cover (7).**
4. Remove cushion (8).
5. **Place barrier material (E80) (9) on lower cushion (10).**



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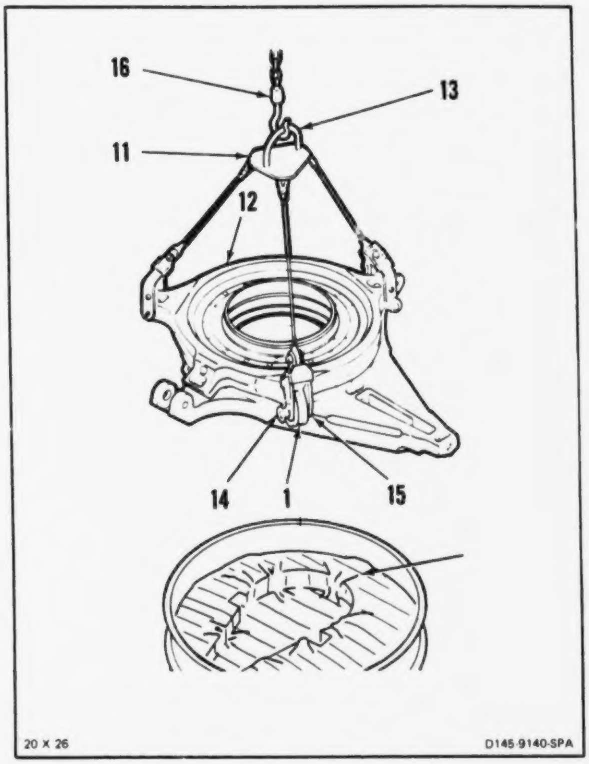
5-130 PREPARE SWASHPLATE FOR STORAGE AND SHIPMENT (Continued) 5-130

6. **Install sling (T14) (11) on swashplate (12)** as follows:
   a. Position lifting eye (13) over swashplate (12).
   b. Remove three quick-release pins (14) from links (15).
   c. Position three links (15) outside of swashplate lugs (1).
   d. Install three quick-release pins (14).
7. **Attach hoist (16)** to sling (T14) (11).

WARNING

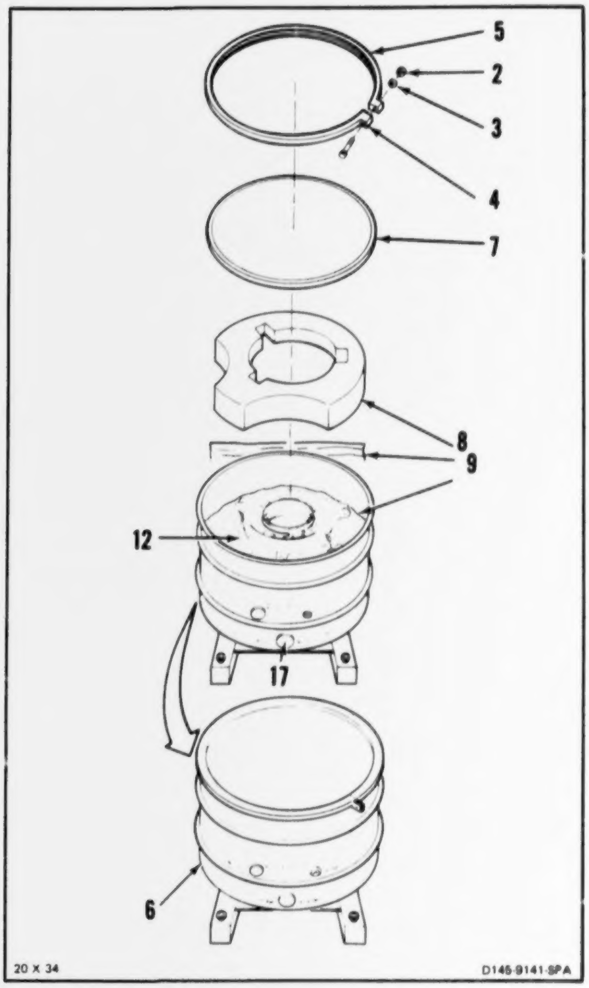
Swashplate is heavy and can injure personnel if it drops. Swashplate must be supported by hoist and moved carefully to prevent injury.

8. **Raise swashplate (12),** align and **lower into container (T107) (6).**
9. Remove pins (14). Remove sling (T14) (11).



5-130 PREPARE SWASHPLATE FOR STORAGE AND SHIPMENT (Continued) 5-130

10. **Place barrier material (E80) (9) over swashplate (12).**
11. **Position upper cushion (8).**
12. **Position cover (7)** on container (T107) (6). **Install ring (5).** Use bolt (4), washer (3), and nut (2).
13. **Place swashplate records in receptacle (17).**



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5-130 PREPARE SWASHPLATE FOR STORAGE AND SHIPMENT (Continued) 5-130

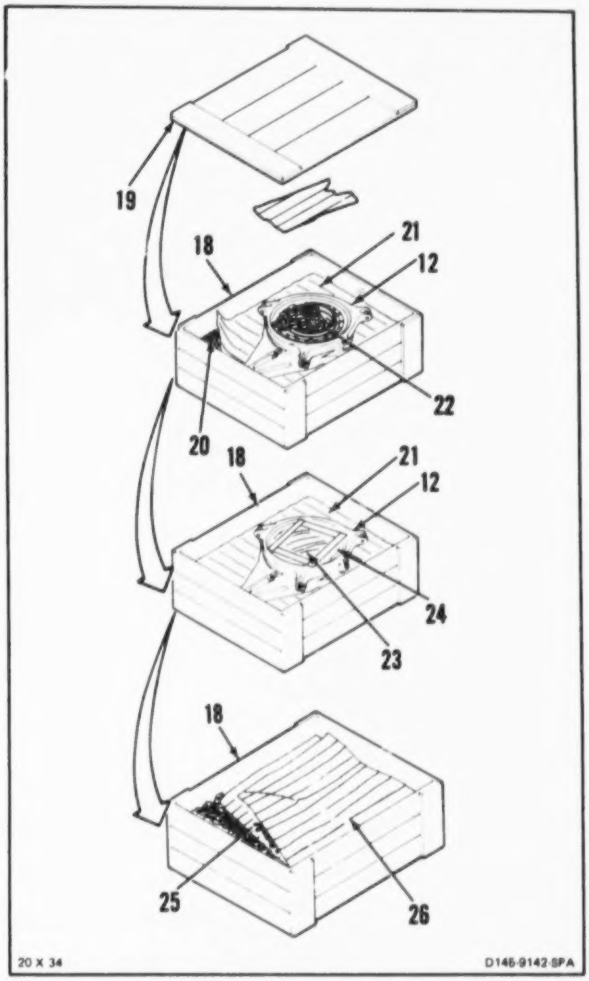
PACK SWASHPLATE IN WOOD BOX

14. **If container (T107) (6) is not available, use wood box 32 x 30 x 12 inches (18).**
15. Remove cover (19).
16. **Place layer of cushioning material (E241) (20) in box (18).**
17. **Place barrier material (E80) (21) over cushioning material (E241) (20).**
18. **Place swashplate (12) in box (18)** (steps 6 through 9).
19. **Pack cushioning material (E241) (22) in and around dry bearing area** of swashplate (12).
20. **Cover bearing area of swashplate (12). Use barrier material (E80) (23).**

CAUTION

Do not apply tape (E395) to dry bearings. Surface of bearings can be damaged.

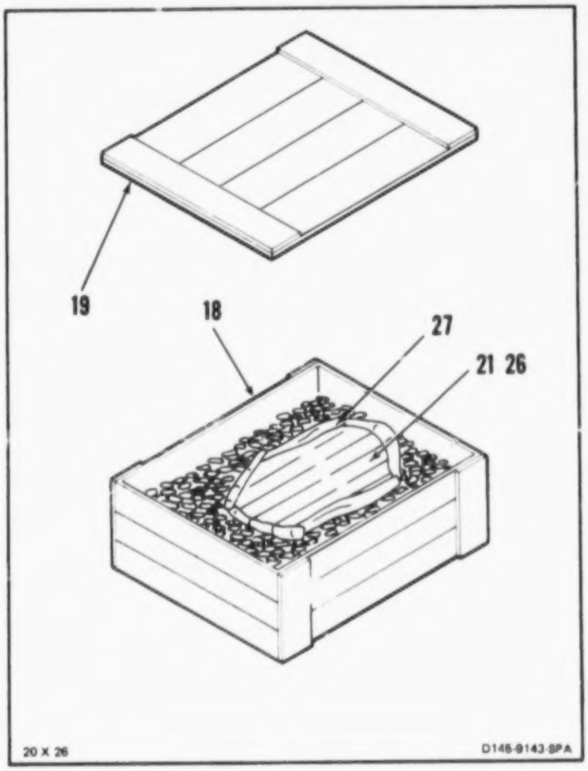
21. **Apply tape (E395) (24)** to install barrier material (E80) (23).
22. **Cover swashplate (12). Use cushioning material (E241) (25).**
23. Cover cushioning material (E241) (25). Use barrier material (E80) (26).



GO TO NEXT PAGE

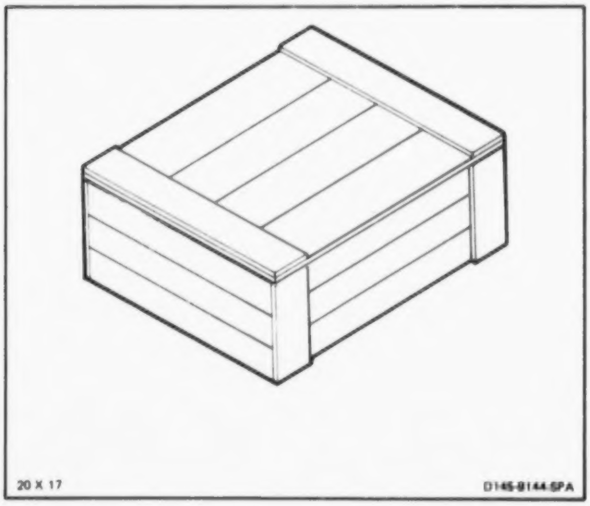
5-130 PREPARE SWASHPLATE FOR STORAGE AND SHIPMENT (Continued) 5-130

24. **Fold layers of barrier material (E80) (21 and 26) together,** and seal with tape (E395) (27).
25. **Install cover (19)** on box (18).


19
18
27
21 26
20 X 26
D146-9143-SPA

FOLLOW-ON MAINTENANCE:

None


20 X 17
D146-9144-SPA

END OF TASK

5-131 PLACE SWASHPLATE IN SERVICE 5-131

INITIAL SETUP

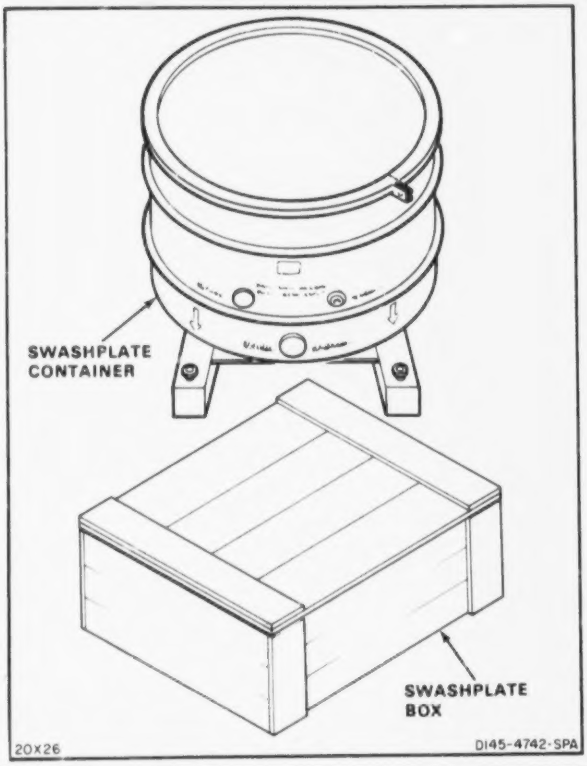
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Rotary-Wing Controls Sling (T14)
Hoist
Hand Lubricating Gun

Materials:
Cloth (E120)
Grease (E189)

Personnel Required:
67U10 Medium Helicopter Repairer
67U20 Medium Helicopter Repairer

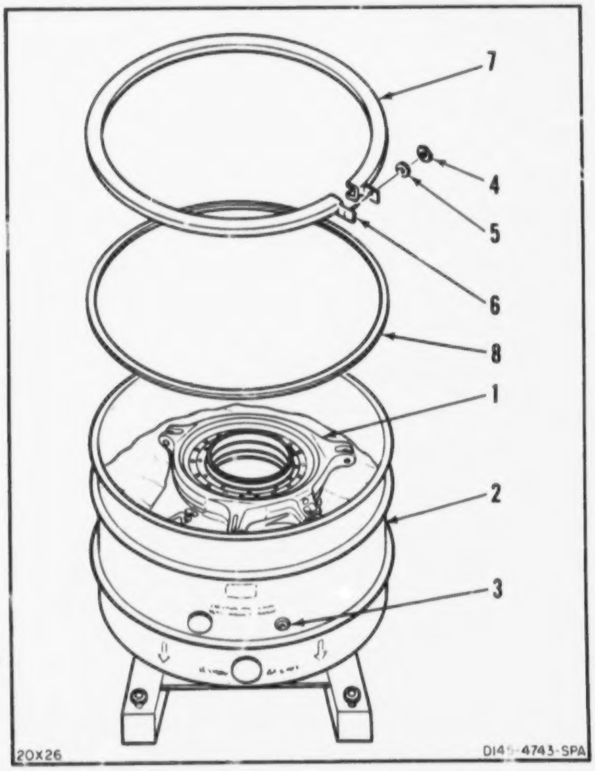
Equipment Condition:
Off Helicopter Task


SWASHPLATE CONTAINER
SWASHPLATE BOX
20X26
DI45-4742-SPA

NOTE

Procedure is same to place forward or aft swashplate in service.

1. **If swashplate (1) is packed in shipping container (T107) (2),** do the following:
   a. Press relief valve plunger (3).
   b. Remove nut (4), washer (5), bolt (6), and clamp ring (7).
   c. Remove cover (8).


7
4
5
6
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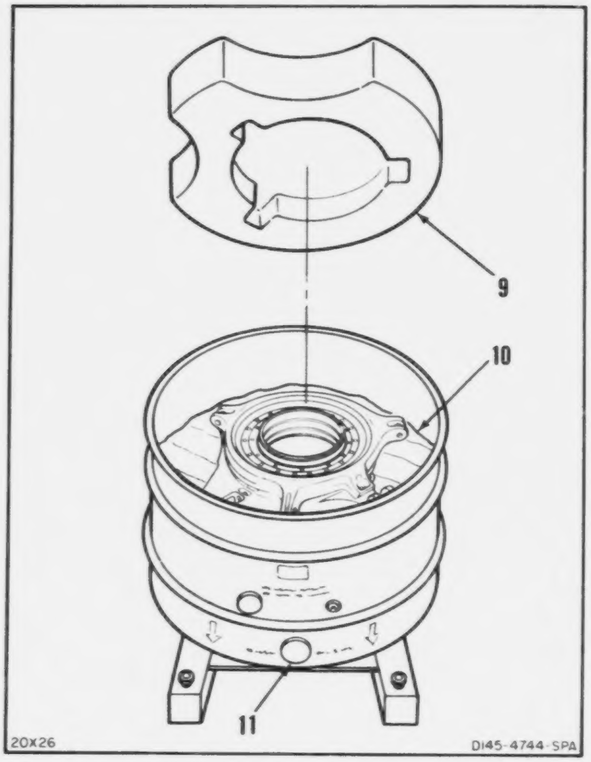
20X26
DI45-4743-SPA

GO TO NEXT PAGE

5-131 PLACE SWASHPLATE IN SERVICE (Continued) 5-131

d. Remove top cushion (9) and unwrap barrier material (10).

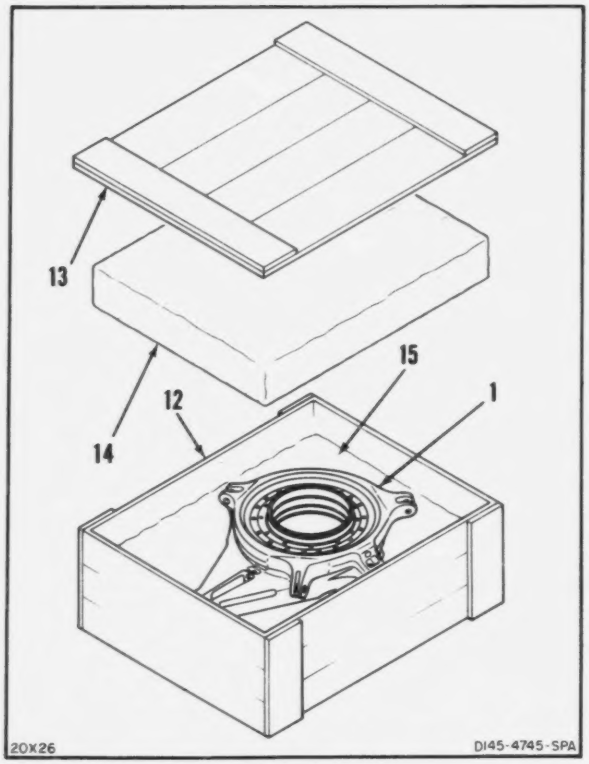
e. Remove swashplate records from receptacle (11).


9
10
11
20X26
DI45-4744-SPA

2. **If swashplate (1) is packed in box (12),** do the following:

   a. Remove cover (13) from box (12).

   b. Remove cushioning material (14) and unwrap barrier material (15).


13
15
1
12
14
20X26
DI45-4745-SPA

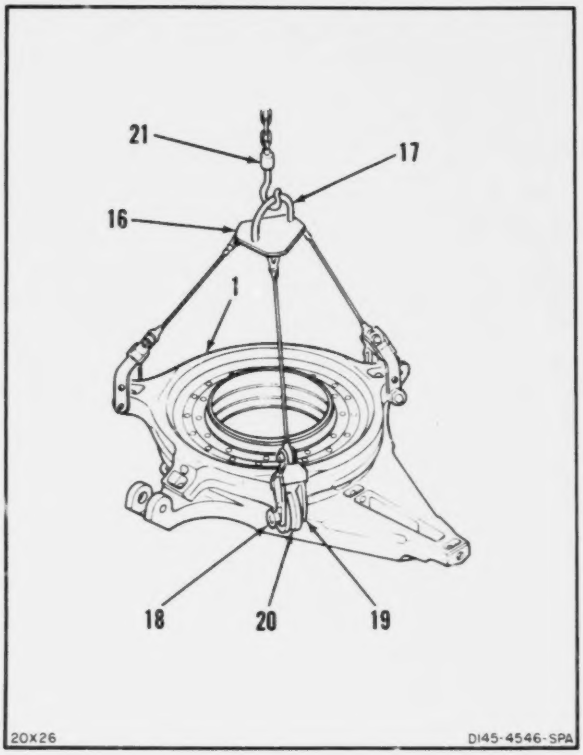
GO TO NEXT PAGE

3. **Install sling (T14) (16) on swashplate (1)** as follows:
   a. Position lifting eye (17) over swashplate (1).
   b. Remove three-quick release pins (18) from links (19).
   c. Position three links (19) outside of swashplate lugs (20).
   d. Install three quick-release pins (18).
4. **Attach hoist (21)** to sling (T14) (16).

WARNING

Swashplate is heavy and can injure personnel if it drops. Swashplate must be supported by hoist and moved carefully to prevent injury.

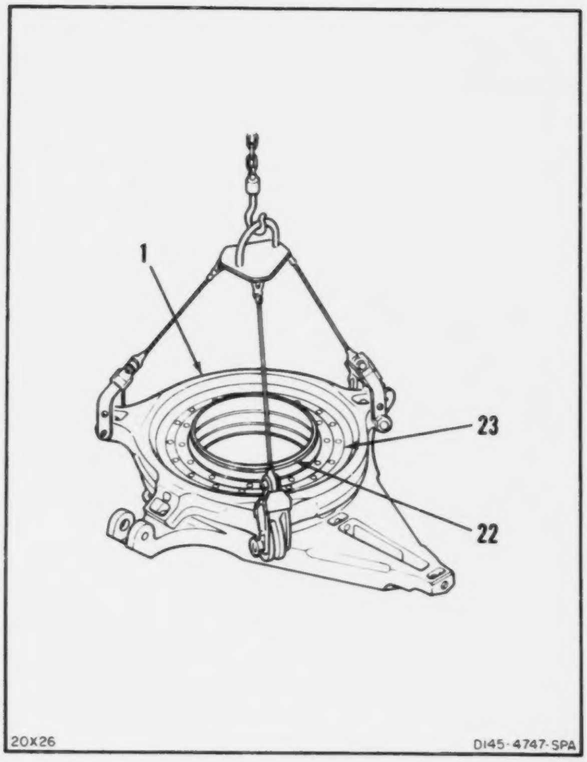
5. **Lift and support swashplate (1).**



6. **Fill swashplate (1) with grease (E190)** while turning rotating ring (22) one full circle. Fill until grease appears all around stationary grease seal (23). Use hand lubricating gun.
7. Wipe off excess grease around stationary grease seal (23). Use cloth (E120).

FOLLOW-ON MAINTENANCE:

Install swashplate (Task 5-132 or 5-133).



END OF TASK

5-132 INSTALL FORWARD SWASHPLATE 5-132

INITIAL SETUP

Applicable Configurations:
All

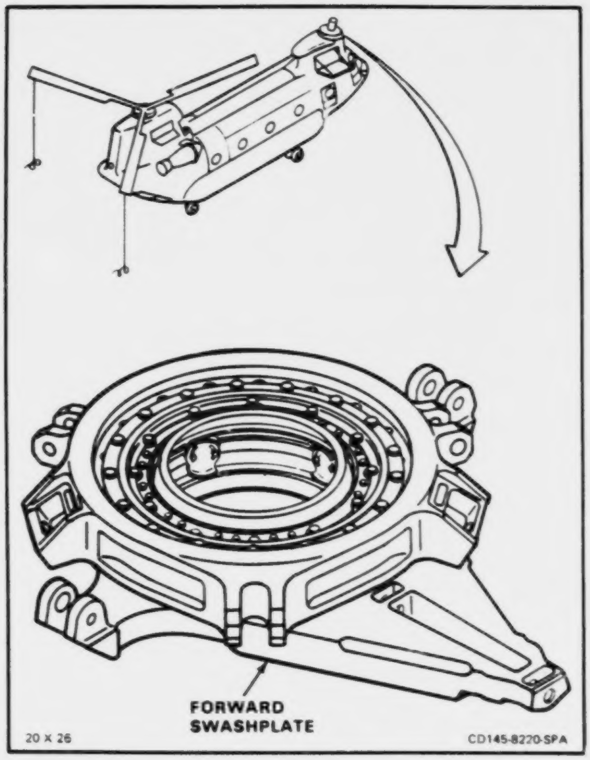
Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Controls Sling (T14)
Torque Wrench, 100 to 750 Inch-Pounds
Torque Wrench, 30 to 150 Inch-Pounds

Materials:
Lockwire (E231)

Parts:
Cotter Pins

Personnel Required:
67U10 Medium Helicopter Repairer (2)
67U20 Medium Helicopter Repairer
67U30 Inspector

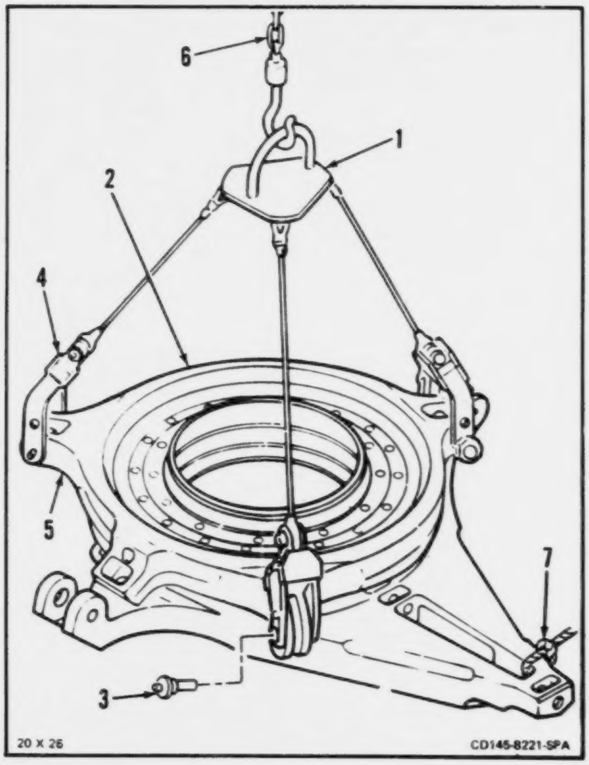
References:
TM 55-1520-240-23P



NOTE

Positive retention bolts are installed in the upper controls. They have a pawl which prevents nut or bolt removal unless the pawl is depressed (Task 1-14).

1. **Install controls sling (T14) (1)** on swashplate (2) as follows:
   a. Remove three quick-release pins (3).
   b. Position three links (4) on lugs (5).
   c. Install pins (3).
2. **Attach hoist chain (6)** to sling (T14) (1).
3. Attach guide line (7) to swashplate (2).



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5-132 INSTALL FORWARD SWASHPLATE (Continued) 5-132

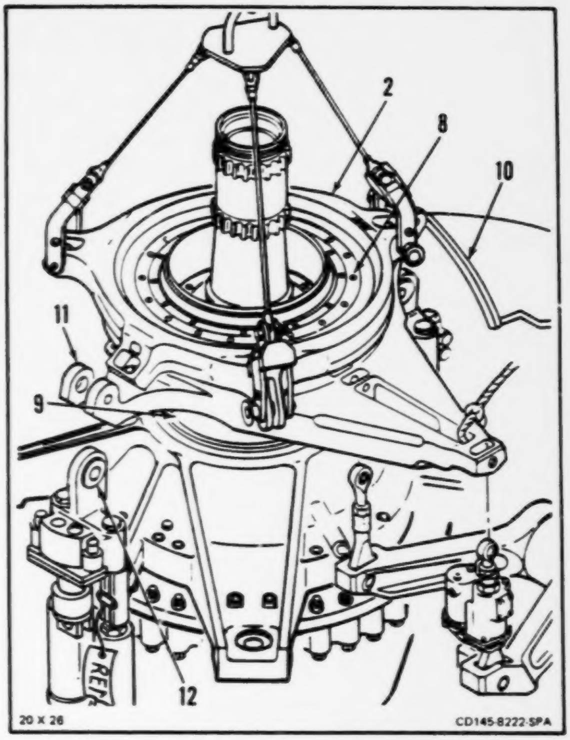
WARNING

Swashplate is heavy and can injure personnel if it drops. Swashplate must be supported by hoist and moved carefully to prevent injury to personnel.

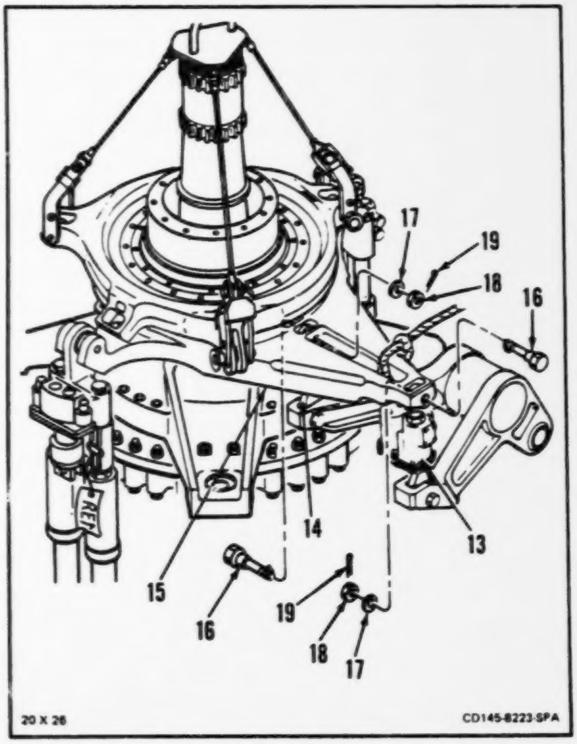
CAUTION

If bearing hits or binds on slider shaft, bearing surfaces can be damaged.

4. **Lift swashplate (2)** and guide ball spherical bearing (8) onto slider shaft (9). Have helper lower yoke end of swashplate to clear fairing (10). **Guide lugs (11) onto two actuating cylinder lugs (12).**



5. Have helper **lift actuator (13) and link (14) and position in swashplate stationary ring (15).** Install two bolts (16) with heads apart. Install two washers (17) and nuts (18). **Torque nuts to 290 to 660 inch-pounds.** Install two cotter pins (19).



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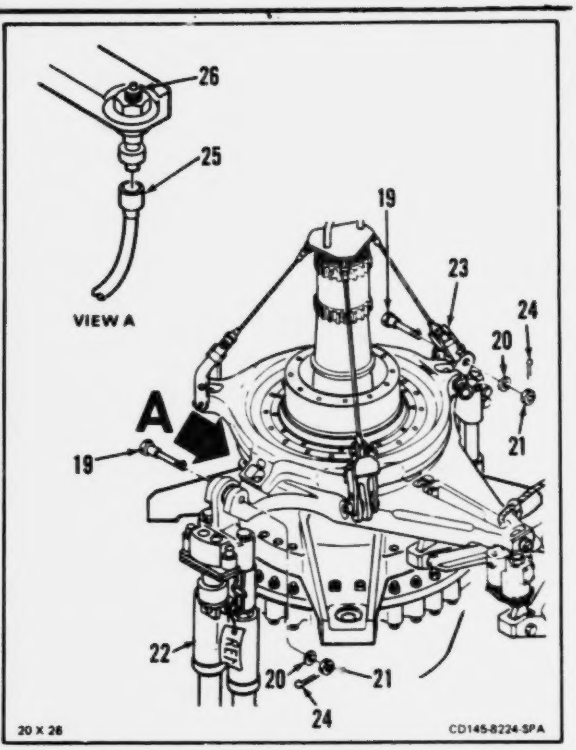
NOTE

Coat bushing OD and bolt shank with antiseize (E75). Do not get antiseize on bolt thread.

6. **Install bolts (19), washers (20), and nuts (21) in actuating cylinders (22 and 23). Torque nuts to 290 to 660 inch-pounds.** Install cotter pins (24).
7. **Connect connector (25)** to magnetic phase detector (26).


26
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VIEW A
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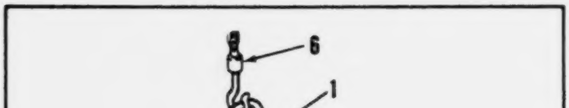
20 X 28
CD145-8224-SPA

8. Lower hoist chain (6).
9. Remove guide line (7).
10. Remove three quick-release pins (3). **Remove controls sling (T14) (1).**


6
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20 X 28
CD145-8225-SPA

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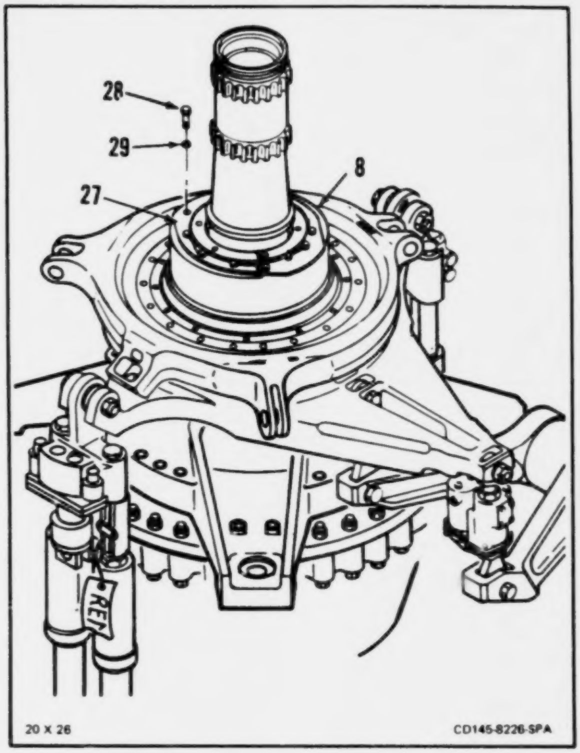
5-132 INSTALL FORWARD SWASHPLATE (Continued) 5-132

NOTE

Bolt holes for shaft seal are not evenly spaced. Holes must be aligned.

11. **Install two halves of shaft seal (27)** on slider shaft (8). Install 12 bolts (28) and washers (29). **Torque bolts to 60 inch-pounds.**
12. Lockwire bolts (29). Use lockwire (E231).

INSPECT



FOLLOW-ON MAINTENANCE:

Install weather protective cover, drive collar, and pitch links (Task 5-111).

Install drive arms (Task 5-112).

Install rotary-wing head (Task 5-9).

Install forward rotary-wing blades (Task 5-84).

Remove servocylinder safety blocks (Task 11-29).

Close forward work platforms (Task 2-2).

END OF TASK

5-133 INSTALL AFT SWASHPLATE 5-133

INITIAL SETUP

Applicable Configurations:
All

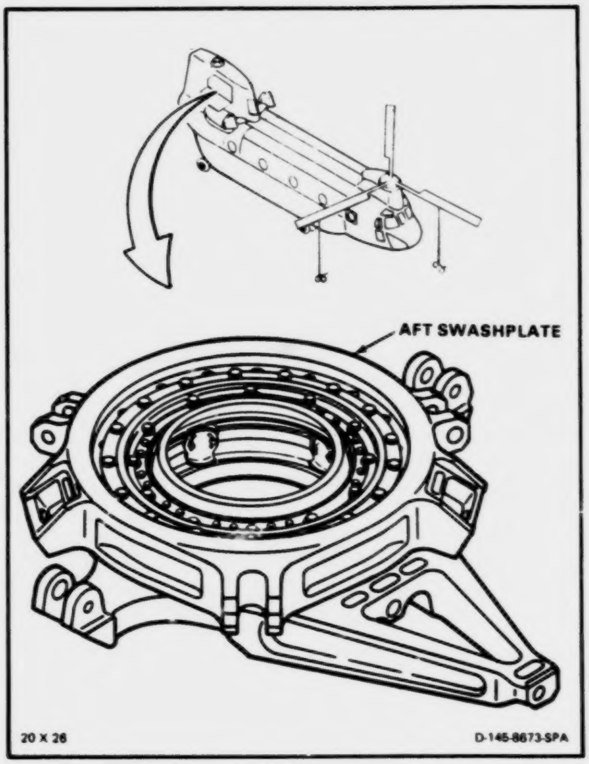
Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Controls Sling (T14)
Torque Wrench, 100 to 750 Inch-Pounds
Torque Wrench, 300 to 2500 Inch-Pounds
Hoist
Guide Line

Materials:
Lockwire (E231)

Parts:
Cotter Pins

Personnel Required:
67U10 Medium Helicopter Repairer (2)
67U20 Medium Helicopter Repairer
67U30 Inspector

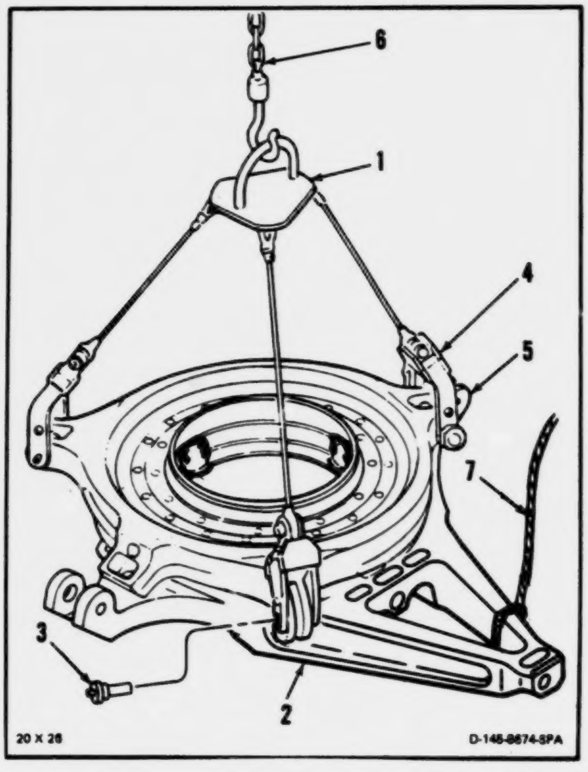
References:
TM 55-1520-240-23P



NOTE

Positive retention bolts are installed in the upper controls. They have a pawl which prevents nut or bolt removal unless pawl is depressed (Task 1-14).

1. **Install controls sling (T14) (1)** on swashplate (2) as follows:
   a. Remove three quick-release pins (3).
   b. Position three links (4) on lugs (5).
   c. Install pins (3).
2. Attach hoist chain (6) to sling (T14) (1).
3. Attach guide line (7) to swashplate (2).



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5-133 INSTALL AFT SWASHPLATE (Continued) 5-133

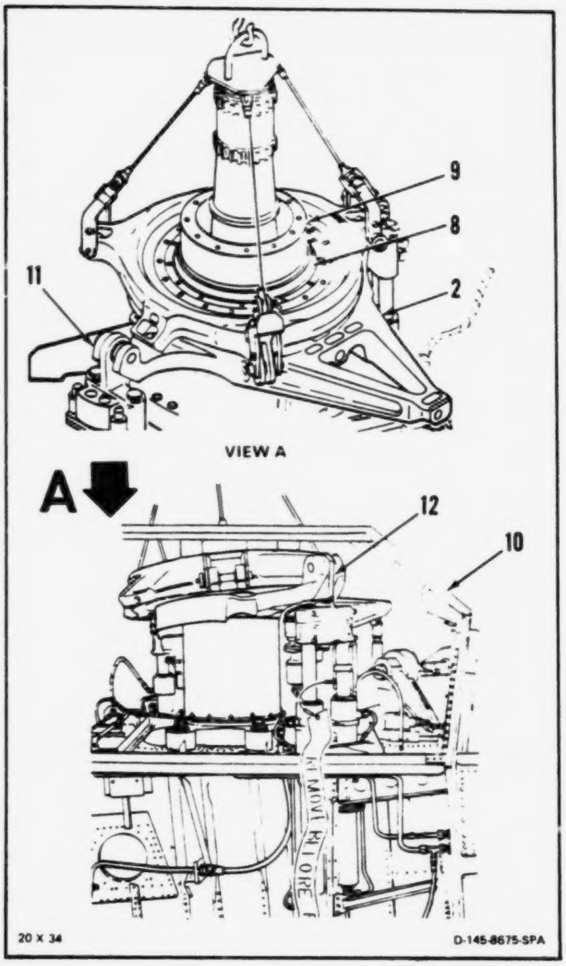
WARNING

Swashplate is heavy and can injure personnel if it drops. Swashplate must be supported by hoist and moved carefully to prevent injury to personnel.

CAUTION

If bearing hits or binds on slider shaft, bearing surfaces can be damaged.

4. **Lift swashplate (2)** and guide ball spherical bearing (8) onto slider shaft (9). Have helper lower yoke end of swashplate to clear pylon (10). **Guide lugs (11) onto two actuating cylinder lugs (12).**


9
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VIEW A
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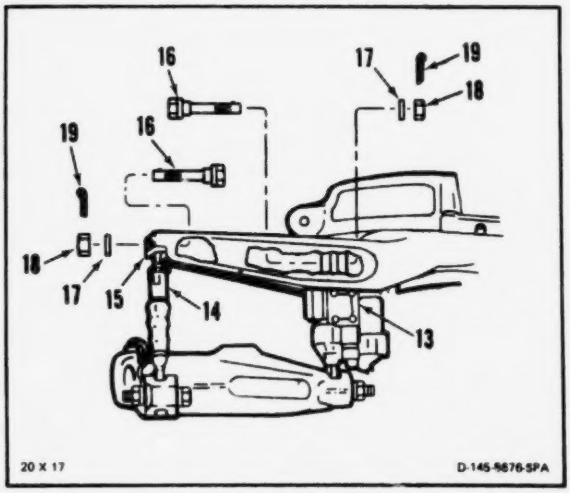
20 X 34
D-145-8675-SPA

5. Have helper **lift actuator (13) and link (14) and position in swashplate stationary ring (15).** Install two bolts (16) head-to-head. Install two washers (17) and nuts (18). **Torque nuts to 660 to 1400 inch-pounds.** Install two cotter pins (19).


16
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20 X 17
D-145-8676-SPA

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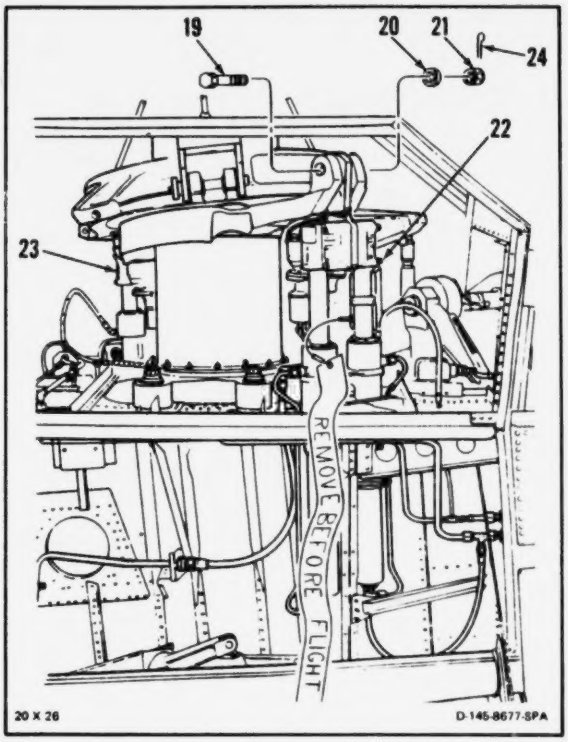
NOTE

Coat bushing OD and bolt shank with antiseize (E75). Do not get antiseize on bolt thread.

6. **Install bolts (19), washers (20), and nuts (21) in actuating cylinders (22 and 23). Torque nuts to 660 to 1400 inch-pounds.** Install cotter pins (24).

INSPECT


19
20
21
24
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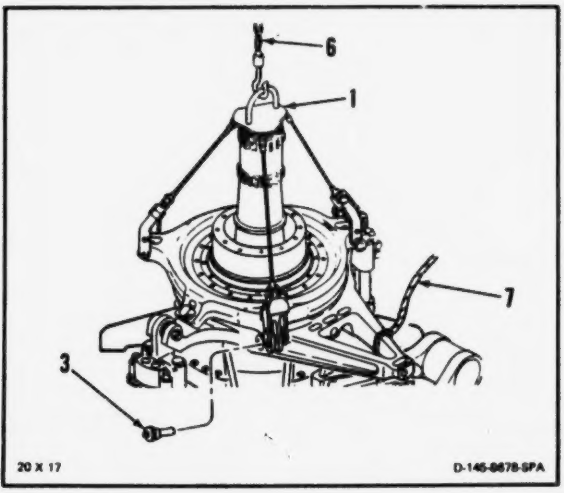
23
REMOVE BEFORE FLIGHT
20 X 26
D-145-8677-SPA

7. Lower hoist chain (6).
8. Remove guide line (7).
9. Remove three quick-release pins (3). **Remove controls sling (T14) (1).**


6
1
7
3
20 X 17
D-145-8678-SPA

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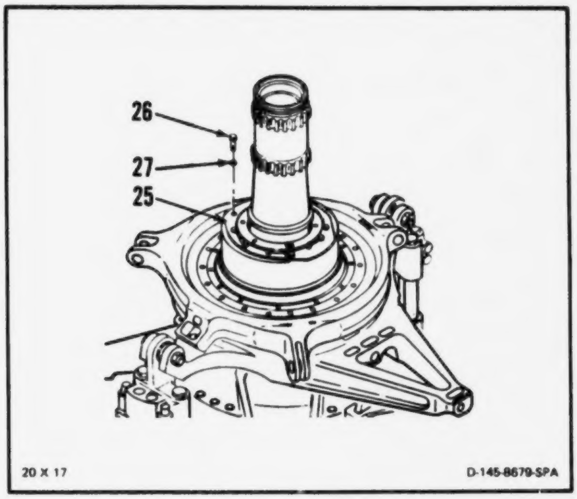
5-133 INSTALL AFT SWASHPLATE (Continued) 5-133

10. **Install slider shaft seal (25).** Use 12 bolts (26) and washers (27). **Torque bolts to 60 inch-pounds.**
11. Lockwire bolts (26). Use lockwire (E231).



FOLLOW-ON MAINTENANCE:

Remove servocylinder safety blocks (Task 11-29).

Install weather protective cover, drive collar, and pitch links (Task 5-111).

Install aft drive arms (Task 5-112).

Install aft rotary-wing head (Task 5-9).

Install aft rotary-wing blades (Task 5-84).

Close work platforms (Task 2-2).

END OF TASK

5-134 REMOVE PITCH LINK BOOT

INITIAL SETUP

Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Materials:
None

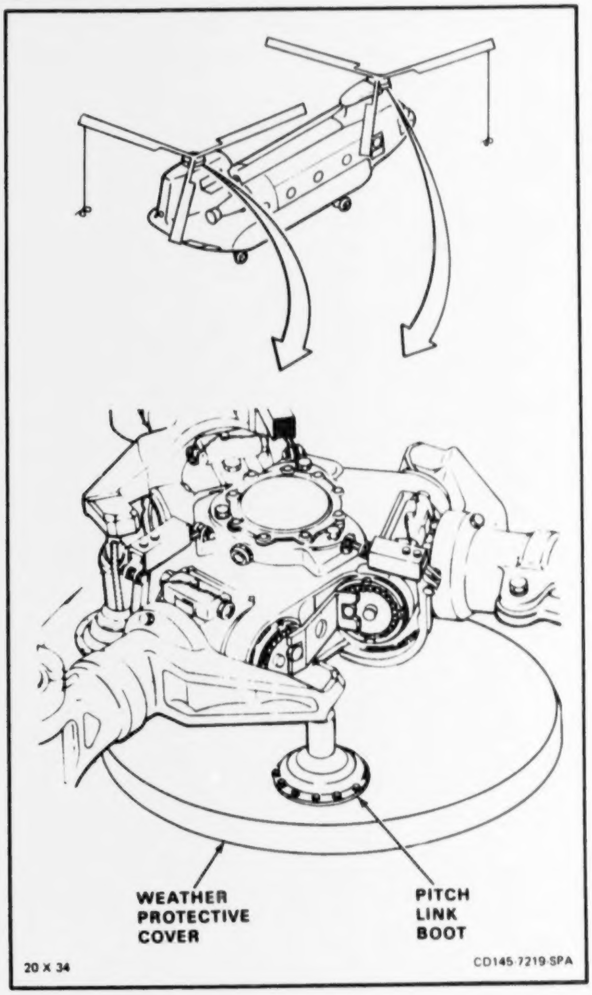
Personnel Required:
67U10 Medium Helicopter Repairer

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Blade Tied Down (Task 1-26)
Forward or Pylon Work Platform Open (Task 2-2)
Pitch Link Disconnected From Swashplate (Task 5-97)

General Safety Instructions:

WARNING

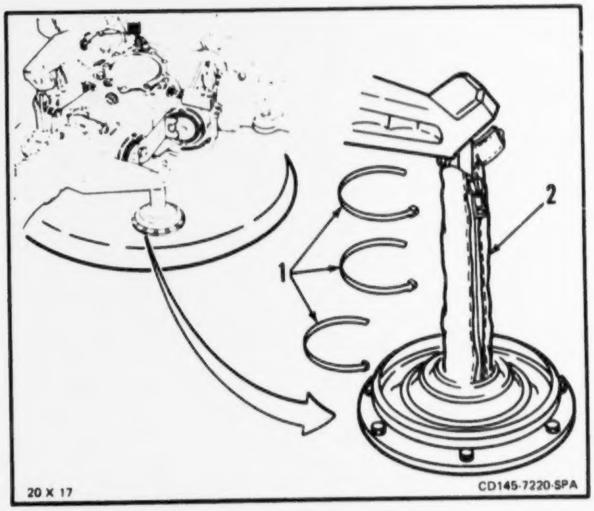
Pitch link must be disconnected before performing this task.


WEATHER PROTECTIVE COVER
PITCH LINK BOOT
20 X 34
CD145-7219-SPA

NOTE

Procedure is same to remove all six pitch link boots. Removal of pitch link boot on forward weather protective cover is shown here.

1. **Remove ties (1)** from pitch link boot (2).


1
2
20 X 17
CD145-7220-SPA

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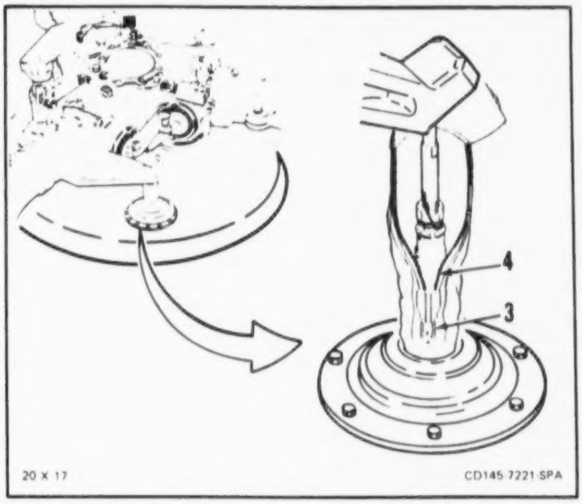
5-134 REMOVE PITCH LINK BOOT (Continued) 5-134

2. **Pull tab (3)** on interlocking slide fasteners (zipper) (4) **all the way down.**

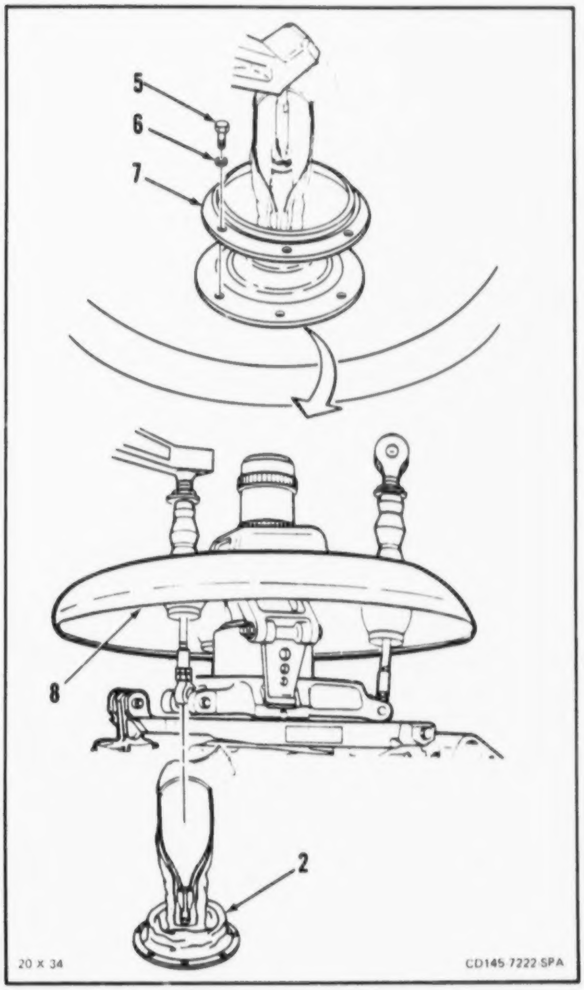

4
3
20 X 17
CD145-7221-SPA

3. Remove eight screws (5) and washers (6). **Lift retaining ring (7).**
4. Pull boot (2) loose and down through weather protective cover (8). **Remove boot.**

FOLLOW-ON MAINTENANCE:

None

END OF TASK


5
6
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20 X 34
CD145-7222-SPA

5-135 INSTALL PITCH LINK BOOT 5-135

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Materials:

Straps (E374) or Twine (E433)
Gloves (E186)
Cloth (E120)
Dry Cleaning Solvent (E162)

Personnel Required:

67U10 Medium Helicopter Repairer
67U30 Inspector

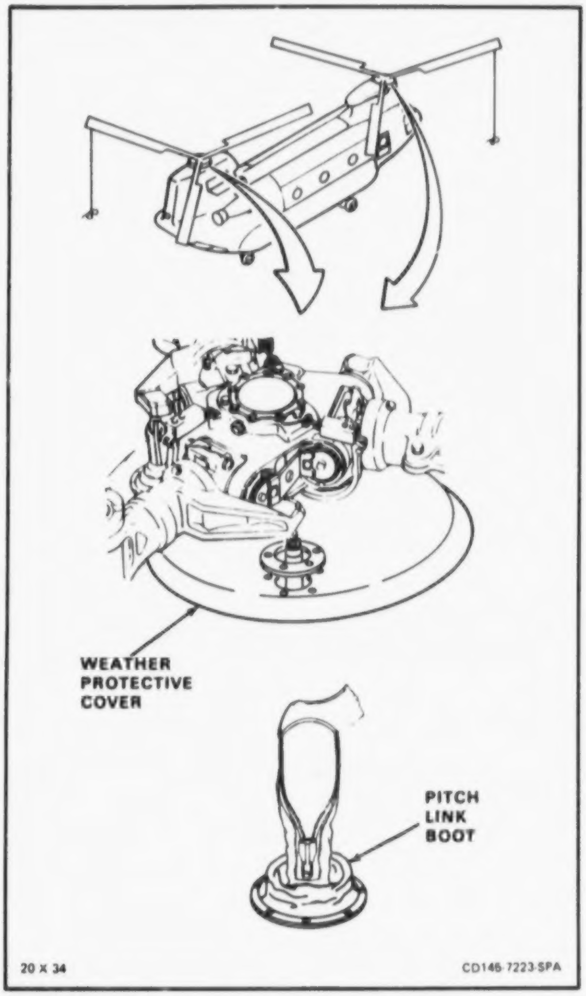
References:

TM 55-1520-240-23P
Task 5-99

General Safety Instructions:

WARNING

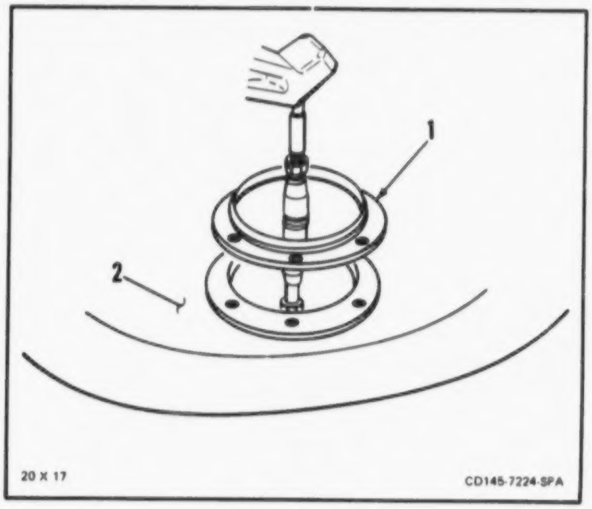
Dry cleaning solvent (E162) is flammable and toxic. It can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



NOTE

Procedure is same to install all six pitch link boots. Installation of pitch link boot on forward weather protective cover is shown here.

1. **Clean contact surfaces of retaining ring (1) and cover (2).** Use cloth (E120) damp with solvent (E162). Wear gloves (E186).



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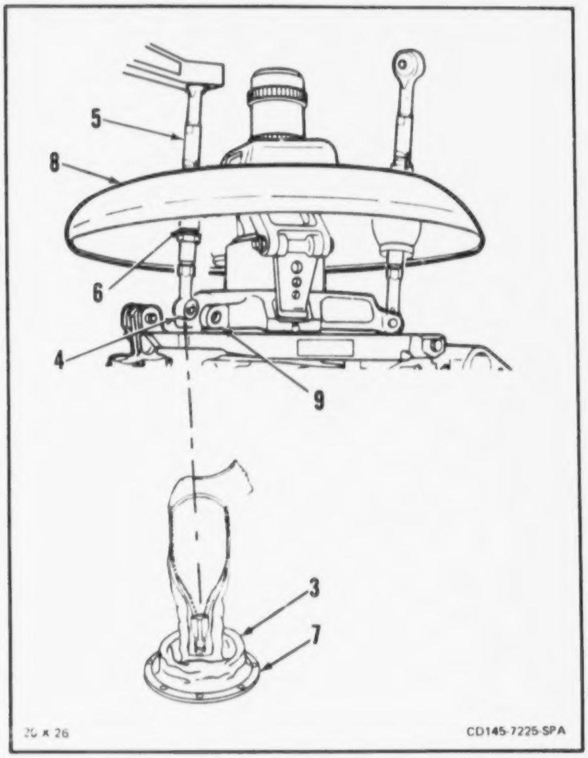
5-135 INSTALL PITCH LINK BOOT (Continued) 5-135

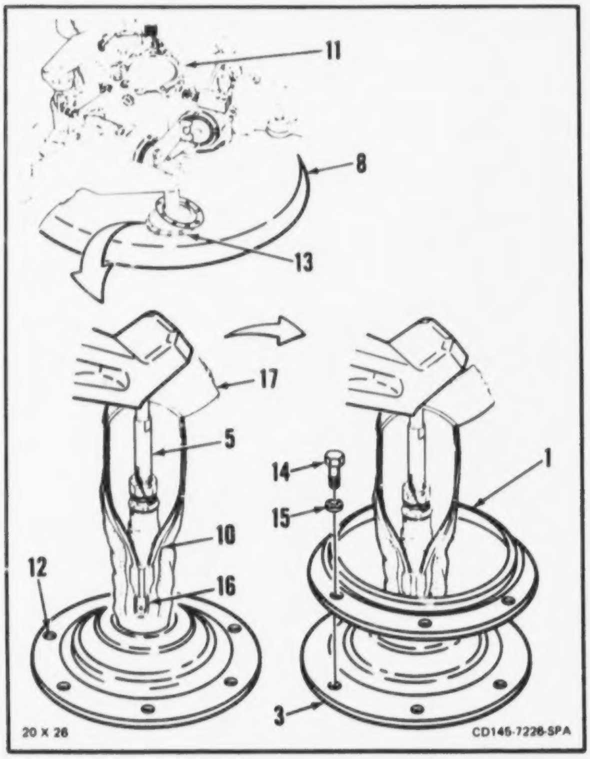
2. **Position pitch link boot (3)** up **over lower rod end (4)** of pitch link (5). Pull boot over turnbuckle (6). Pull flange (7) of boot up through weather protective cover (8).
3. **Connect pitch link (5)** to swashplate (9) (Task 5-99).



NOTE

Interlocking slide fasteners (zipper) must be positioned away from rotary-wing head. Pitch link adjustment will be difficult if zipper is not accessible.

4. Position boot (3) with zipper (10) facing away from rotary-wing head (11). Align boot holes (12) with holes (13) in cover (8).
5. **Position retaining ring (1)** on boot (3). **Install eight screws (14)** and washers (15).
6. **Pull tab (16) of zipper (10) all the way up.**
7. **Close cone (17)** around pitch link (5).



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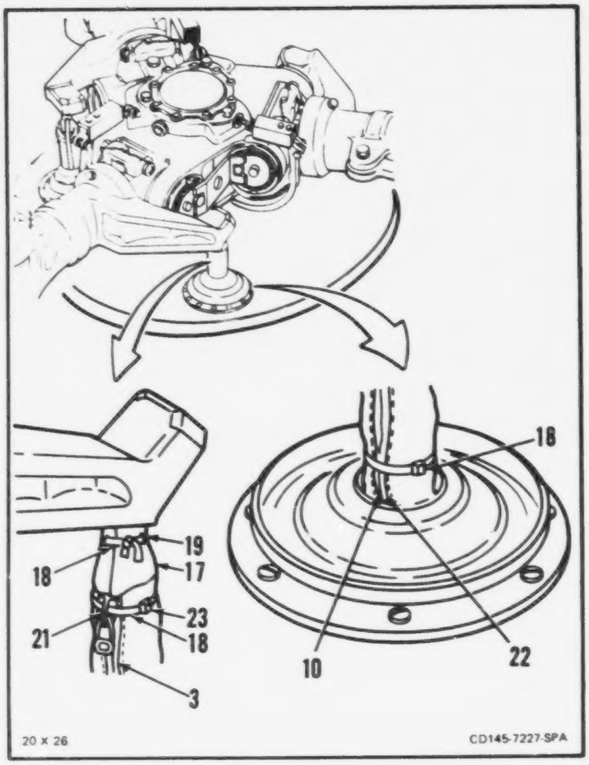
5-135 INSTALL PITCH LINK BOOT (Continued) 5-135

NOTE

If straps (E374) are used to tie pitch link boot, do step 8. If twine (E433) is used to tie pitch link boot, do step 9.

8. If using straps (E374) (18) **tie pitch link boot (3)** as follows:
    a. Install upper strap (E374) (18) through loops (19) in cone (17).
    b. Install middle strap (E374) (18) through zipper slider (21).
    c. Install lower strap (E374) (18) at bottom of zipper (10) over zipper pull (22).
    d. Cut off straps (E374) (18) 1/4-inch from locks (23).



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5-135 INSTALL PITCH LINK BOOT (Continued) 5-135

9. If using twine (E433) (24) **tie pitch link boot (3)** as follows:

   a. Cut two 24-inch lengths of twine (E433) (24).

   b. Tie one 1-inch loop (25) 6 inches from one end of length of twine (E433) (24).

   c. Pass long end of twine (E433) (24) around boot (3) at bottom of zipper (10), and through loop (25).

   d. Pull twine (E433) (24) tight and wrap around boot (3) four to five times.

   e. Tie ends of twine (E433) (24) together with double square knot (26).

   f. Cut off ends of twine (E433) (24) 1/4-inch from knot (26).

   g. Pass end of another length of twine (E433) (24) around cone (17) through loops (19) three times.

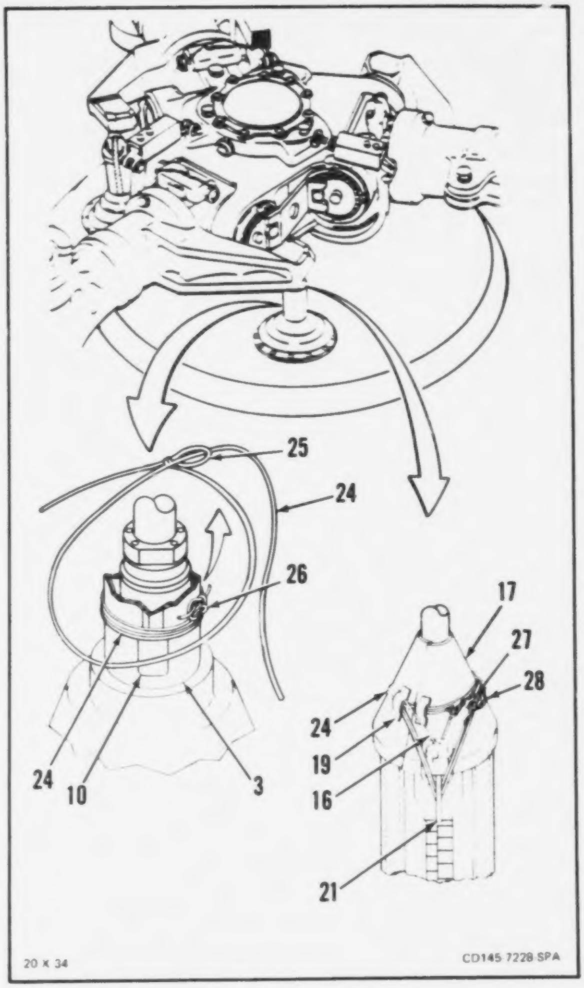
   h. Tie ends of twine (E433) (24) together with square knot (27).

   i. Pass long end of twine (E433) (24) through tab (16) of zipper (10), then through loops (19) around cone (17).

   j. Pass twine (E433) (24) down through zipper slider (21) and back through loops (19) around cone (17).

   k. Tie ends of twine (E433) (24) together with double square knot (28).

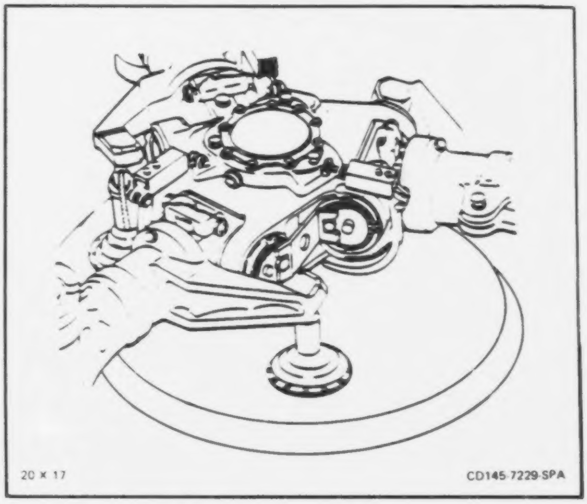
   l. Cut off twine (E433) (24) 1/4-inch from knot (28).



INSPECT

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-136 REMOVE WEATHER PROTECTIVE COVER 5-136

INITIAL SETUP

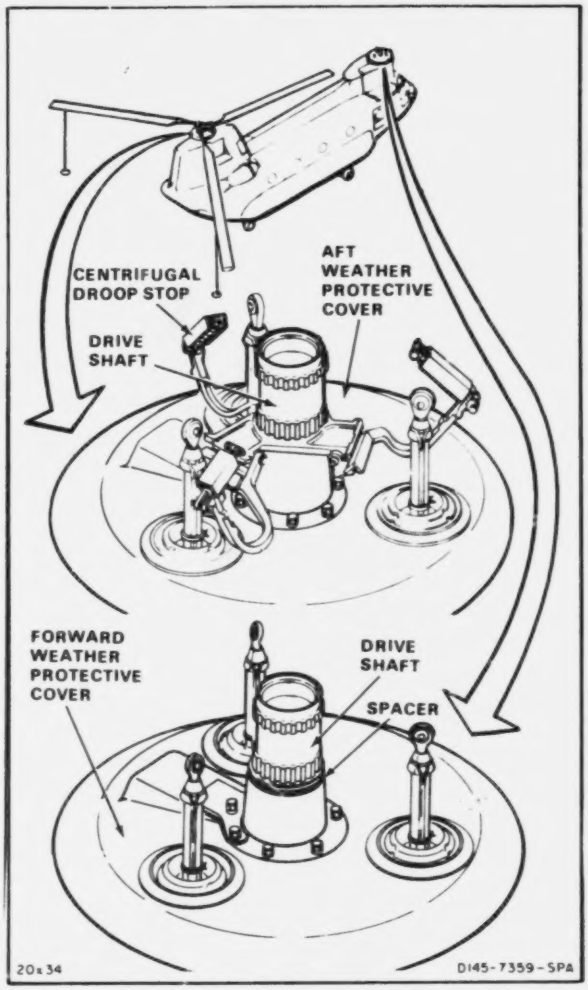
Applicable Configurations:
All

Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692

Materials:
None

Personnel Required:
67U10 Medium Helicopter Repairer
67U20 Medium Helicopter Repairer

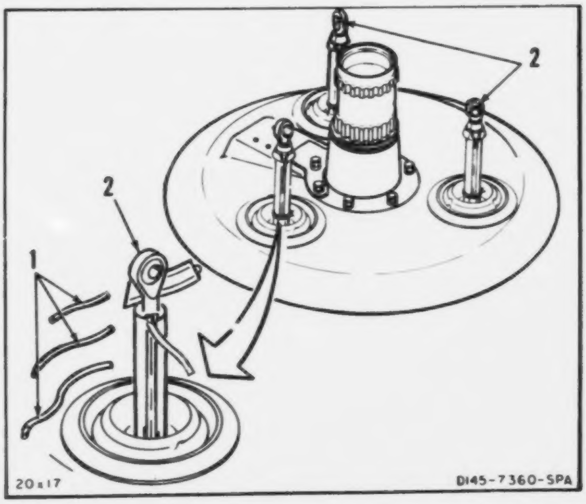
Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
Two Forward or Two Aft Blades Tied Down (Task 1-26)
Forward or Pylon Work Platforms Open (Task 2-2)
Rotary-Wing Blades Removed (Task 5-64)
Rotary-Wing Head Removed (Task 5-8)


CENTRIFUGAL DROOP STOP
DRIVE SHAFT
AFT WEATHER PROTECTIVE COVER
FORWARD WEATHER PROTECTIVE COVER
DRIVE SHAFT
SPACER
20x34
D145-7359-SPA

NOTE

Procedure is similar to remove forward or aft weather protective covers. Differences are noted in text.

1. **Remove ties (1)** from three pitch link boots (2).


2
2
1
20x17
D145-7360-SPA

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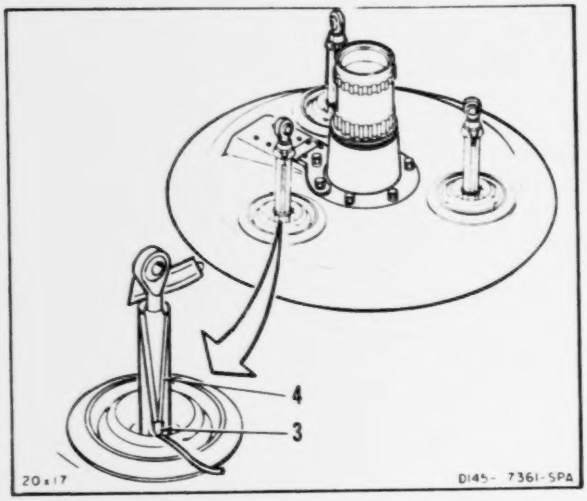
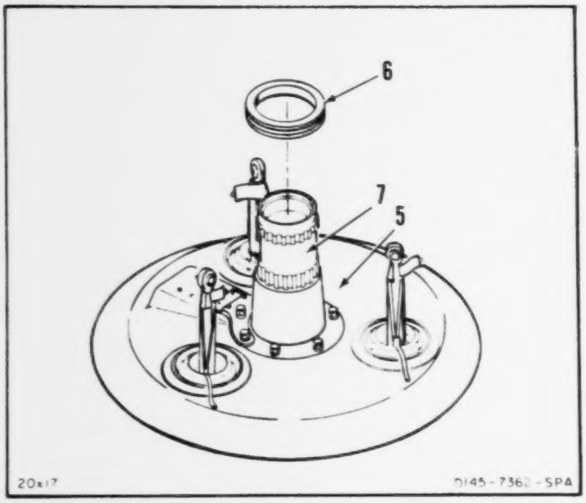
5-136 REMOVE WEATHER PROTECTIVE COVER (Continued) 5-136

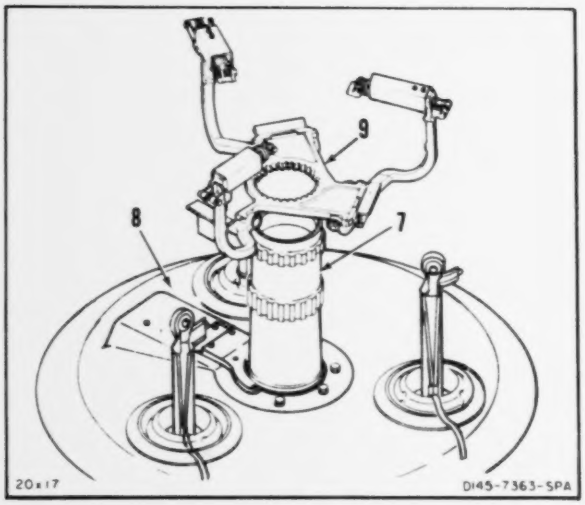
2. Pull tabs (3) down to **open** interlocking slide fasteners **(zippers) (4).**


4
3
20x17
D145-7361-SPA

3. For forward weather protective cover (5) only, **remove spacers (6)** from drive shaft (7). Then go to step 5.


6
7
5
20x17
D145-7362-SPA

4. For aft weather protective cover (8) only, **remove centrifugal droop stop (9)** from drive shaft (7).


9
8
7
20x17
D145-7363-SPA

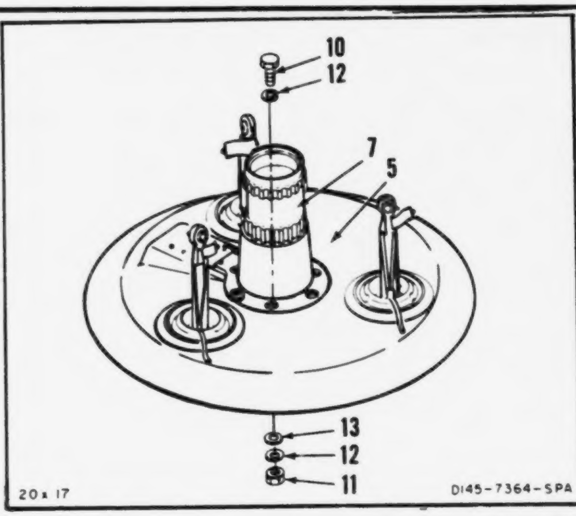
GO TO NEXT PAGE

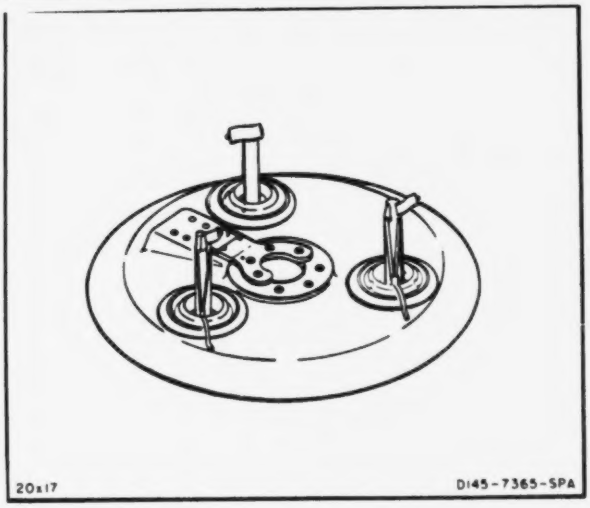
5. **Remove 8 bolts (10),** 8 nuts (11), and 24 washers (12 and 13).

CAUTION

Do not damage pitch link or boots when removing cover.

6. With helper, lift cover (5) over drive shaft (7). **Remove cover.**


10
12
7
5
13
12
11
20 x 17
D145-7364-SPA


20x17
D145-7365-SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-137 REPAIR WEATHER-PROTECTIVE COVER (AVIM) 5-137

INITIAL SETUP

Applicable Configurations:

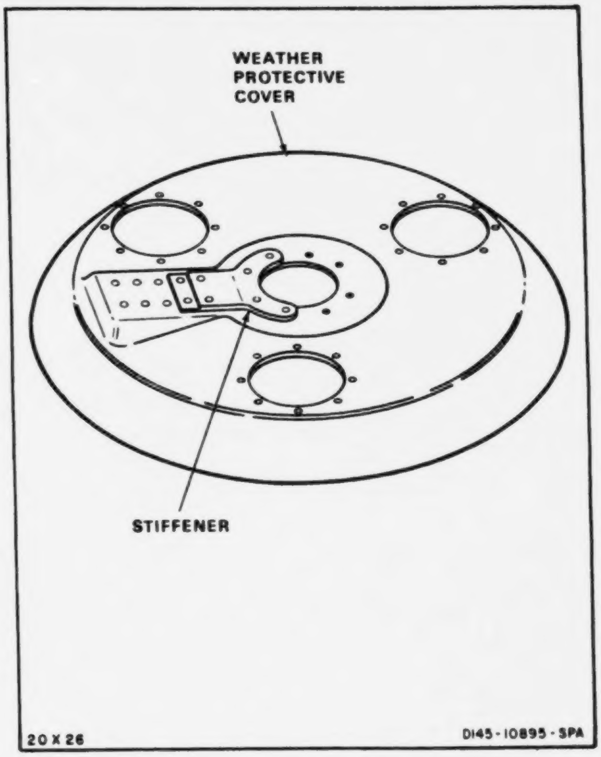
Without **15**

Tools:

- Airframe Repairer's Tool Kit, NSN 5180-00-323-4876
- Hypodermic Syringe
- Heat Lamp
- Scissors
- Trip Balance, NSN 6670-00-401-7195
- Electric Drill
- Drill Bits
- Shot Bags
- Aluminum Wedges, 0.040-Inch Tapered to 0.016-Inch
- Aluminum Wedges, 0.125-Inch Tapered to 0.016-Inch
- Vacuum Supply and Vacuum Gage, 0 to 30 Inches Hg
- Stopwatch
- Stiff-Bristle Brush
- Bolts AN3-4A (2)
- Nuts EWSN22-3 (2)
- Washers AN960-PD10 (2)
- C Clamps

Materials:

- Abrasive Paper (E6 and E7)
- Acetone (E20)
- Adhesive (E27)
- Adhesive (E40 and E41)
- Adhesive (E47)
- Adhesive Pack (E50)
- Cloth (E120)
- Filler (E171)
- Polyvinyl Sheet (E284)
- Glass Cloth (E130 and E132)
- Gauze (E183)
- Gloves (E186)
- Hardener (E191)
- Hardener (E193)
- Hardener (E194)
- Teflon Fabric (E170)
- Rubber Sheet (E321)
- Sealing Tape (E396)
- Plastic Cups (E157)
- Toluene (E423)
- Tongue Depressors (E424)
- Temperature Indicating Strips (E413)
- Squeeze Bottle (E366)
- Resin (E312)



Personnel Required:

- Aircraft Structure Repairer (2)
- Inspector

References:

TM 55-1520-240-23P

Equipment Condition:

- Off Helicopter Task
- Pitch Link Boots Removed (Task 5-134)

General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

GO TO NEXT PAGE

5-137 REPAIR WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137

WARNING

Adhesives (E27, E40, E41, E47, and E50) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

Procedure is same to repair forward or aft weather-protective cover.

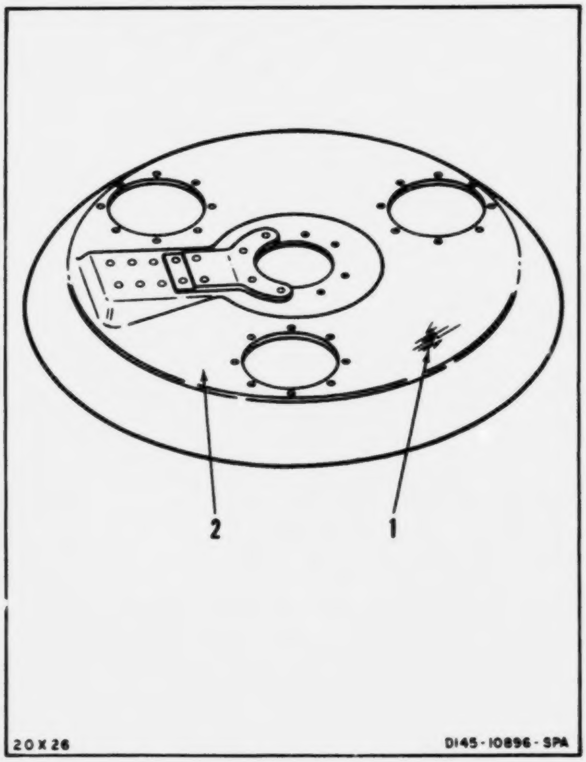
REPAIR SKIN SURFACE DAMAGE

1. **Check surface damage.** Damage is limited to surface scratches, cuts less than 3-inches long, and single-ply breaks less than 1/2-square-inch.

CAUTION

Do not sand into glass cloth. Cloth will be damaged.

2. **Sand damaged surface (1)** of cover (2). Remove finish and loose fibers. Use abrasive paper (E6).
3. **Clean surface (1).** Use cloth (E120) damp with acetone (E20). Wear gloves (E186).



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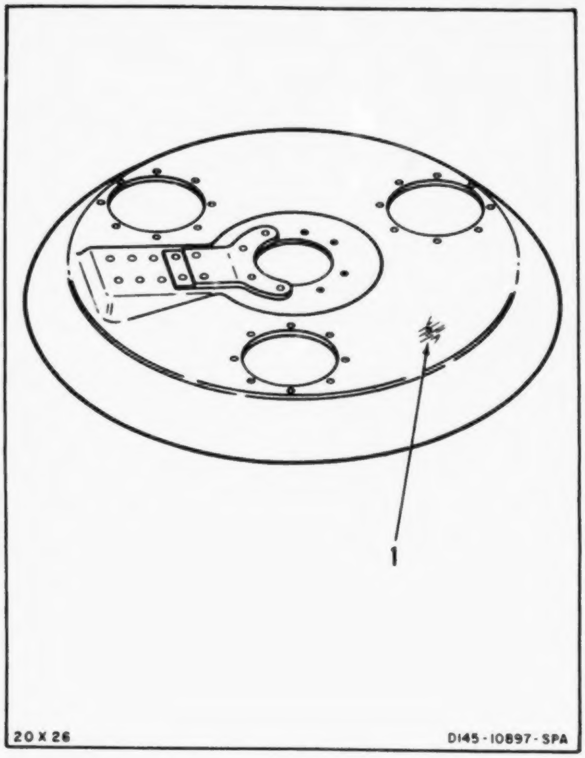
5-137 REPAIR WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137

4. **Mix adhesive** as follows:
   a. Weigh 5 grams of filler (E171) and 100 grams of adhesive (E47). Mix filler with adhesive, slowly in cup (E157). Use tongue depressor (E424). Mix until color is uniform. Wear gloves (E186).
   b. Weigh 16 grams of hardener (E193). Mix hardener with mixture from step a until color is uniform. Use cup (E157) and tongue depressor (E424). Allow mixture to set for 12 hours.
   c. Weigh 7 grams of hardener (E194). Mix hardener thoroughly with mixture from step b. Use tongue depressor (E424).
5. **Apply one coat of adhesive mix** to damaged surface (1).
6. **Cure adhesive mix** as follows:
   a. Allow adhesive mix to gel at 80°F to 150°F (27°C to 66°C). Use heat lamp.
   b. Cure gelled adhesive at 120°F to 150°F (49°C to 66°C) for 30 minutes. Use heat lamp and temperature indicating strips (E356.1).
   c. Raise temperature to 200°F to 230°F (93°C to 110°C) for 30 minutes. Use heat lamp and temperature indicating strips (E413).



INSPECT

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REPAIR SKIN DAMAGE EXTENDING INTO CORE

7. **Check for skin areas with lighter color and broken surface.** This shows that damage reaches to core. Damage shall be less than 1/2-square-inch.
8. **Sand damaged area (3).** Remove finish and loose fibers. Use 80 grit abrasive paper (E6).
9. **Drill 0.028-inch holes (4)** through skin only. Space holes throughout damaged area (3).
10. **Mix adhesive** as follows:

    a. Weigh 100 grams of adhesive (E47). Place in cup (E157). Weigh 50 grams of resin (E312) and 30 grams of hardener (E193). Mix resin and hardener in cup with adhesive. Use tongue depressor (E424). Wear gloves (E186).

    NOTE

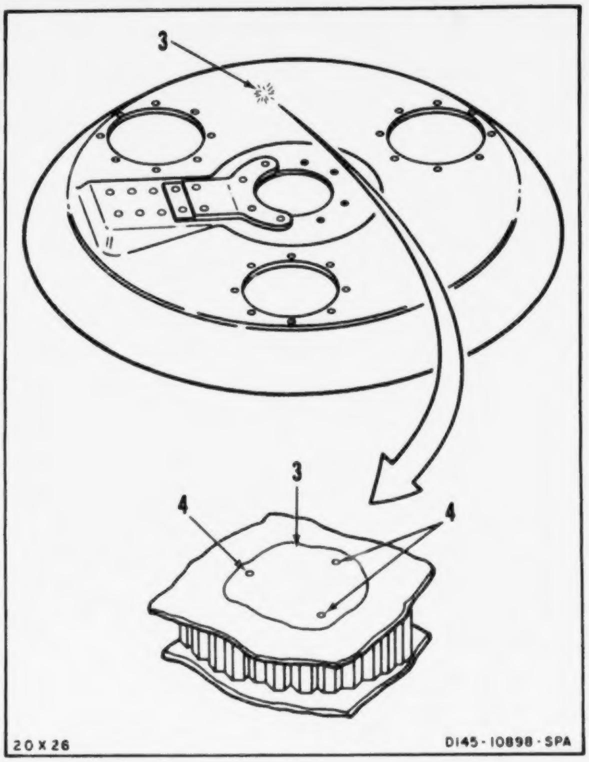
    Mixture from step 10. has indefinite pot life without refrigeration.

    b. Weigh 12 grams of hardener (E194) and 100 grams of resin (E312). Mix in clean cup (E157). Use tongue depressor (E424). Wear gloves (E186).

    NOTE

    Mixture from step 10.b. has pot life of 3 months without refrigeration.

    c. Weigh 100 grams of mixture from step 10.a. and 25 grams of mixture from step 10.b. Mix thoroughly in cup (E157). Use tongue depressor (E424). Wear gloves (E186).



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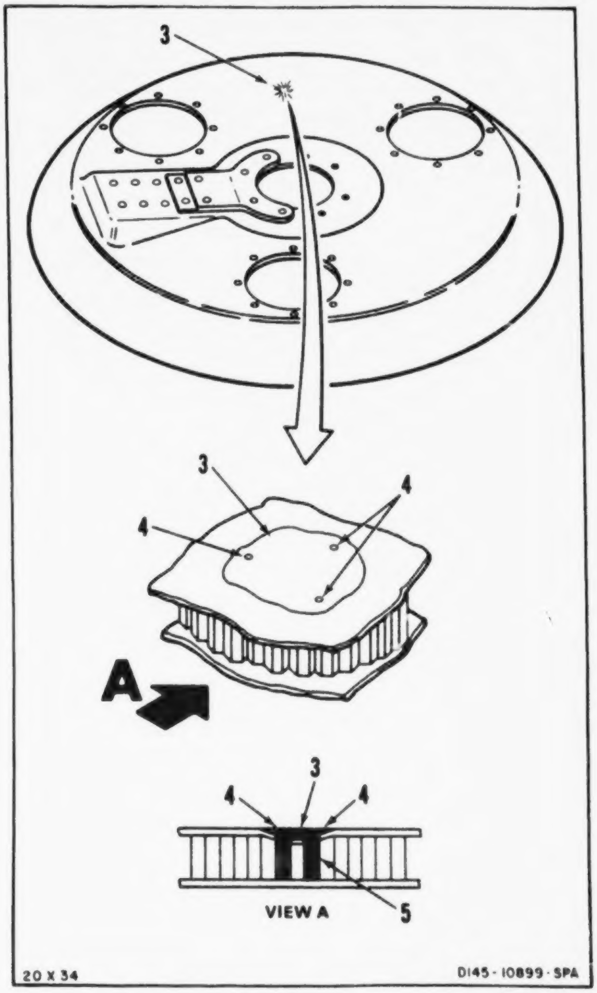
5-137 REPAIR WEATHER-PROTECTIVE COVER (AVIM) (Continued)

NOTE

- Mixture from step 10c has pot life of 10 hours.

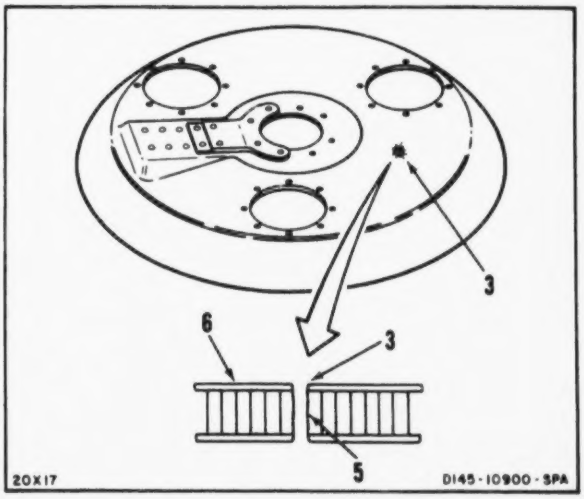
11. **Inject** enough **adhesive** from step 8c **into holes (4)** to fill damaged core cells (5).
12. **Cure adhesive mixture** as follows:
    a. Heat damaged area (3) at 180°F to 200°F (82°C to 93°C) for 4-hours minimum until mixture gels. Use heat lamp.
    b. Raise temperature from 200°F to 230°F (93°C to 110°C) for 1 hour. Use heat lamp.
13. **Roughen damaged area (3).** Use 80 grit abrasive paper (E6).
14. **Fill drilled holes (4)** and any remaining skin damage. Use adhesive from step 10.
15. **Cure adhesive mixture** at 70 to 80°F (21 to 27°C) for 24 hours.

INSPECT



REPAIR SKIN AND CORE DAMAGE

16. **Check for punctures or breaks in one skin and core.** Damage shall not exceed 1/2-square-inch. Check for damage through both skins and core. Damage shall not exceed 1/4 square-inch.
17. **Clean damaged area (3).** Use cloth (E120) damp with acetone (E20). Remove any loose pieces of core (5) or skin (6).



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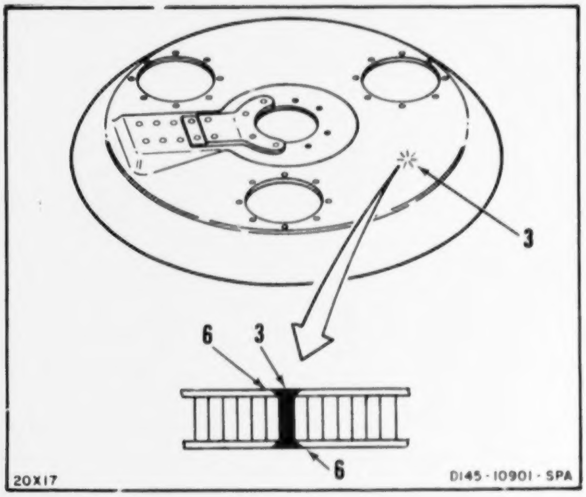
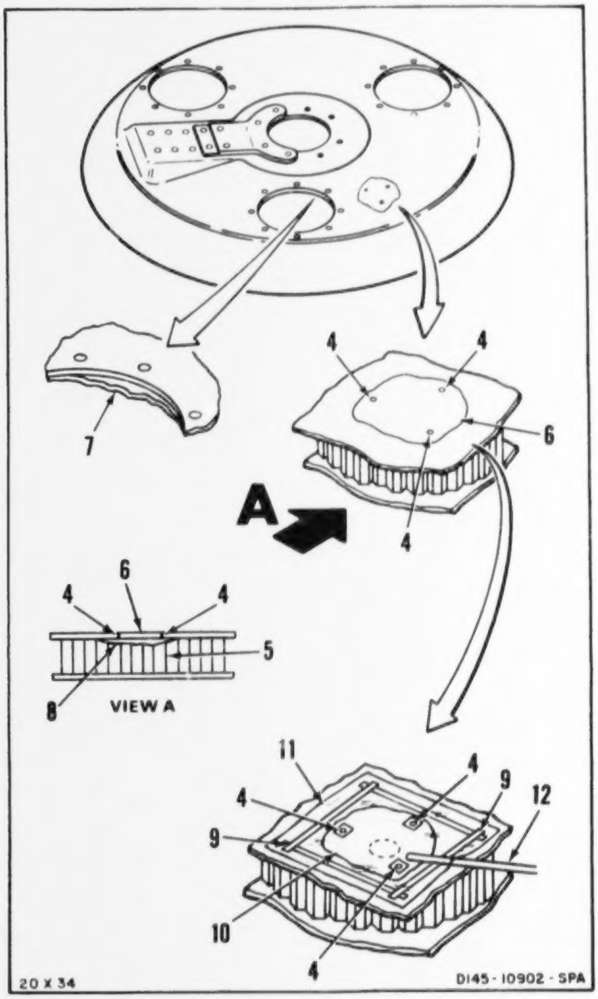
5-137 REPAIR WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137

18. **Fill damaged area (3)** with adhesive pack (E50). Use tongue depressor (E424).
19. **Cure adhesive pack** at 70 to 80°F (21 to 27°C) for 24 hours.
20. Sand adhesive pack to **blend repaired area (3)** into skin (6).

INSPECT



21. **Repair delaminations (7)** around openings. Delaminations shall not exceed 1 square-inch. **Find bond voids (8)** by tapping suspect area with edge of coin. Bond voids shall not exceed 9 square-inches and there shall be no skin damage.
22. For voids only, **drill 0.028-inch holes (4)** 2-inches apart **through skin (6)** over void (8).
23. **Mix adhesive** as in step 10.
24. Fill delamination (7) or void (8) with adhesive. Use hypodermic syringe. For delamination, apply clamp and go to step 28. For void, go to step 25.
25. **If void (8) does not fill completely, apply vacuum** as follows:
    a. Tape all holes (4). Use sealing tape (E396) (9). Drill hole in center of repair area that has not filled.
    b. Apply sealing tape (E396) (9) around repair area (10).
    c. Apply polyvinyl sheet (E284) (11) over repair area (10).
    d. Insert hose (12) of vacuum pump under polyvinyl sheet (E284) (11). Apply vacuum to draw adhesive mix into unfilled part of repair area (10).
    e. Remove hose (12), sheet (11), and tape (9).



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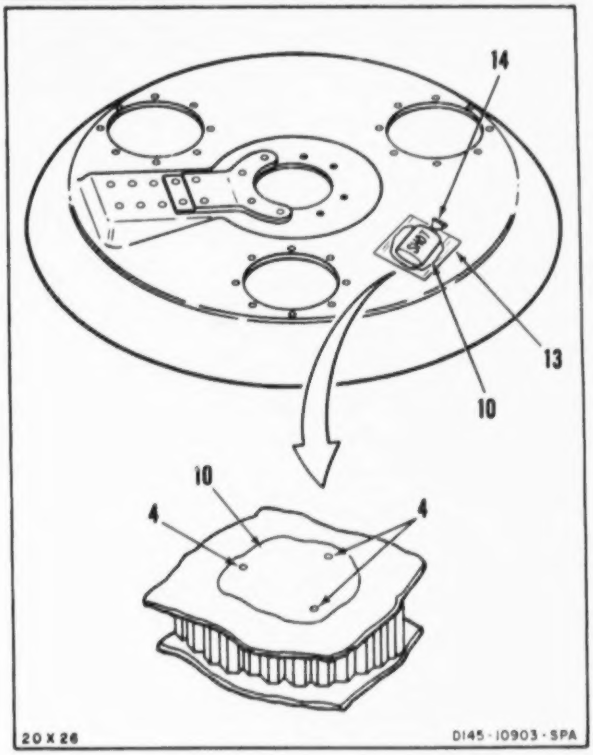
5-137 REPAIR WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137

26. **Remove adhesive from holes (4).** Use hypodermic syringe.
27. **Apply polyvinyl sheet (E284) (13)** over repair area (10). Secure sheet with shot bags (14).
28. **Cure adhesive** as in step 12.
29. **Mix adhesive** as in step 10. Fill holes (4) with adhesive mix. Use hypodermic syringe.
30. **Cure adhesive** at 70 to 80°F (21 to 27°C) for 24 hours.

INSPECT



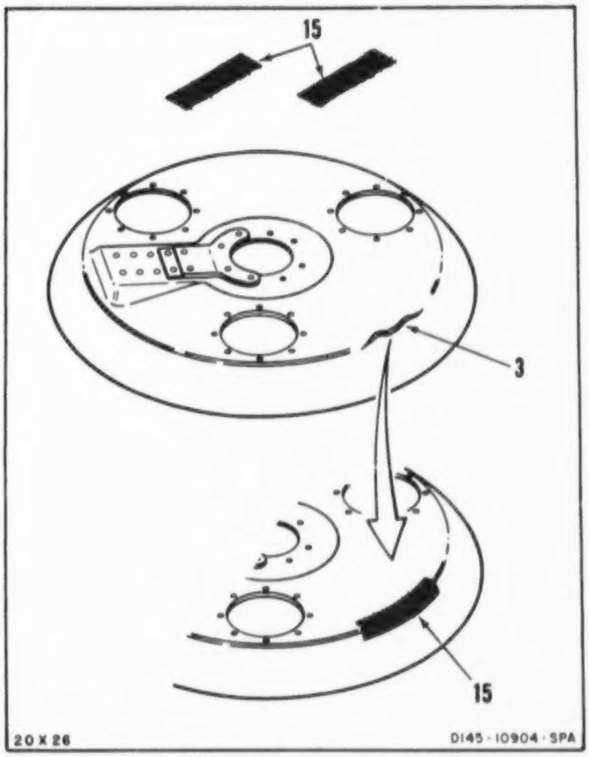
REPAIR SKIN CRACKS

31. Repair cracks at edge of honeycomb. Cracks may appear under cover.
32. **Cut two strips (15)** of **glass cloth (E130)** 1-inch larger than crack on all sides.
33. **Sand damaged area (3).** Use 120 grit abrasive paper (E7). Remove dust. Use vacuum cleaner.

CAUTION

Do not wipe contaminants into damaged area.

34. **Clean surface around damaged area (3).** Use cloth (E120) damp with acetone (E20). Work away from damage. Wear gloves (E186).
35. **Wipe damaged area (3) clean.** Use dry cloth (E120). Turn cloth often. Wipe until no color is on cloth.
36. Mix adhesive (E40). Follow instructions on container. Wear gloves (E186).
37. **Apply adhesive (E40)** to damaged area (3).
38. **Position one piece of glass cloth (E130) (15)** on damaged area (3). Coat cloth with adhesive (E40). Tamp cloth. Use adhesive brush.



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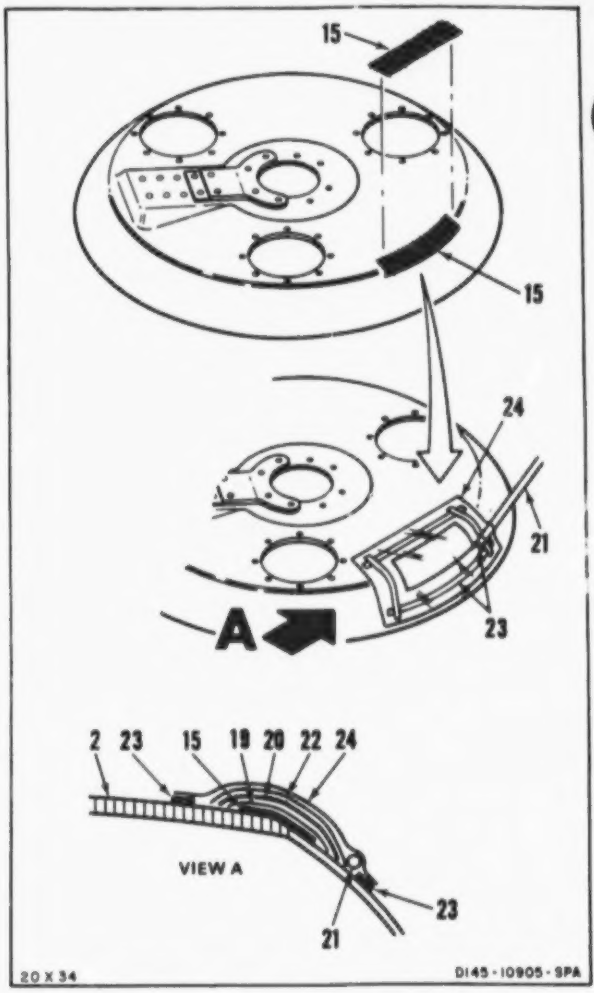
5-137 REPAIR WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137

39. **Position second glass cloth (E130) (15)** over cloth in place. Soak cloths with adhesive (E40). Tamp cloth. Use adhesive brush.
40. Apply pressure to glass cloth (15) as follows:
    a. Apply piece of teflon fabric (E170) (19) over cloth (15).
    b. Apply rubber sheet (E321) (20) over teflon fabric (19).
    c. Wrap end of tube (21). Use glass cloth (E132) (22).
    d. Apply glass cloth (E132) (22) over sheet (E321) (20).
    e. Wrap tube (21) at point outside of repair area. Use sealing tape (E396) (23). Make border around repair. Use tape (E396). Press tape on tubes into border tape.
    f. Press polyvinyl sheet (E284) (24) onto tape border (23).
    g. Apply vacuum source of 3 inches Hg to repair.
41. **Cure adhesive** 24 hours at 70°F (21°C).

INSPECT



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5-137 REPAIR WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137

REPLACE STIFFENER

42. Replace cracked stiffener (16).

43. **Remove two rivets (17) and two rivets (18).**

44. **Remove paint at edge of stiffener (16).** Use acetone (E20). Wear gloves (E186).

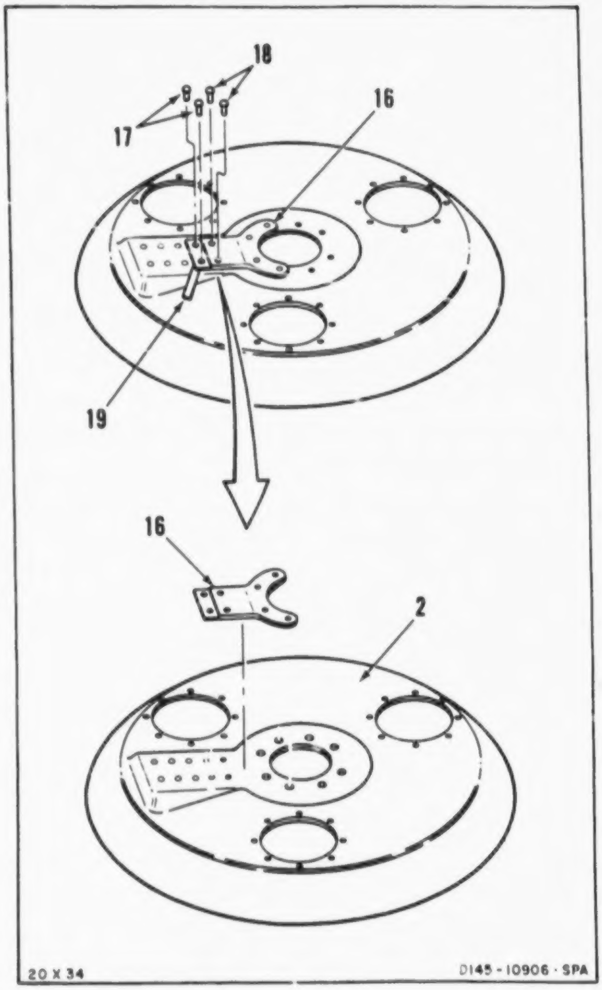
45. Slowly drive 0.040-inch wedge (19) under edge of stiffener. Keep wedge close to stiffeners to prevent damage to skin. Open joint slightly.

46. Apply warm water at 130°F (55°C) into gap under stiffener (18). Use squeeze bottle (E366).

CAUTION

Do not force wedges. Skin can become delaminated.

47. Position 0.125-inch wedges in gap. Apply warm water in gap. Slowly insert wedges into gap. Do not force separation.



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5-137 REPAIR WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137

48. **Check cover (2) for damage** where stiffener was removed. Repair if required.

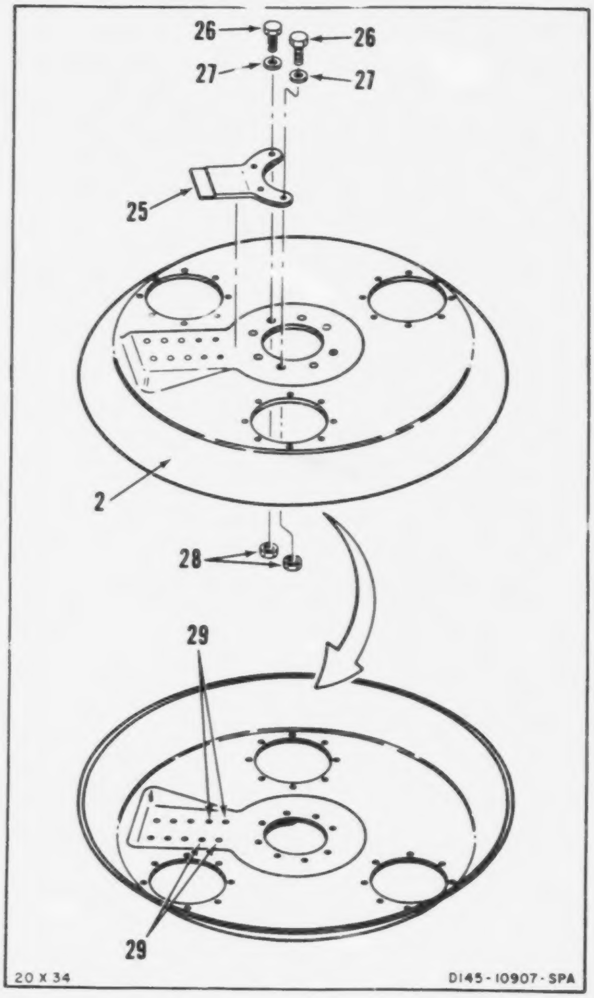
49. **Position stiffener (25)** on cover (2). Install two bolts (26), washers (27), and nuts (28).

50. Turn cover (2) over and **drill 4 holes (29) in stiffener (25).** Use existing holes in cover as a guide.

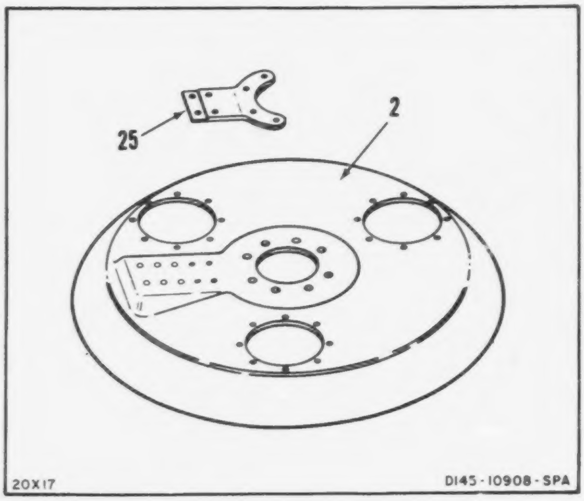
51. **Remove** nuts (28), bolts (26), and washers (27), and **stiffener (25).** Turn cover (2) right side up.

52. **Roughen mating surface** of cover (2). Use 80 grit abrasive paper (E6).

53. **Clean mating surface** of cover (2). Use cloth (E120) damp with acetone (E20). Wear gloves (E186).



54. **Apply** uniform coat of **adhesive (E41)** to mating surfaces of stiffener (25) and cover (2).



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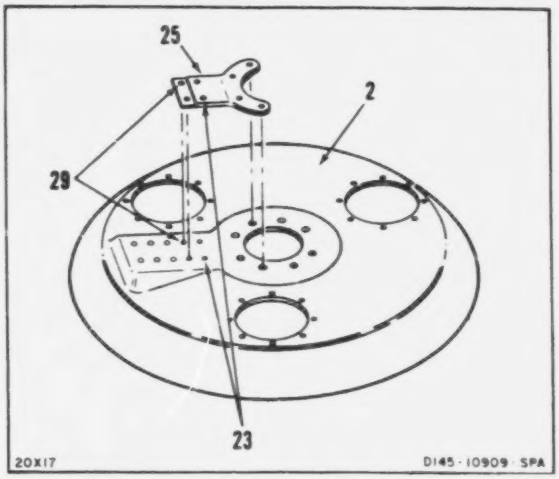
5-137 REPAIR WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137

55. **Position stiffener (25) on cover (2).** Align holes (29).


25
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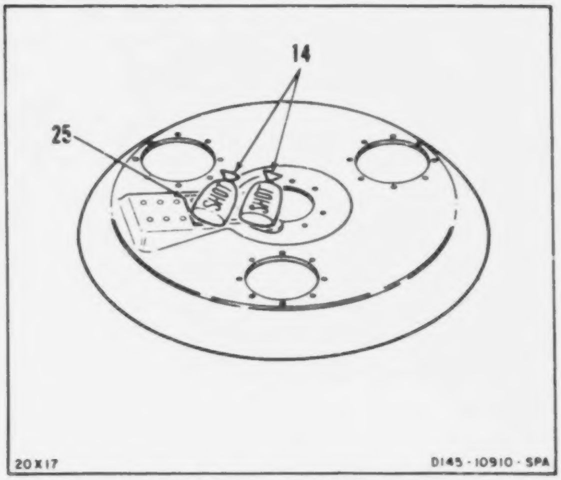
D145-10909-SPA

56. Apply pressure to stiffener (25). Use shot bags (14).

57. **Cure adhesive** for 24 hours at 70 to 80°F (21 to 27°C). Remove shot bags (14).

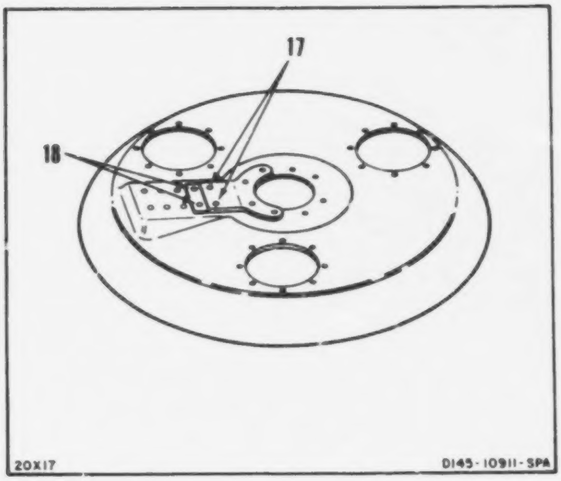

14
25
SHOT
SHOT
20X17
D145-10910-SPA

58. **Install four rivets (17 and 18).**

INSPECT

FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 2-353).


17
18
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END OF TASK

5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) 5-137.1

INITIAL SETUP

Applicable Configurations:

With **15**

Tools:

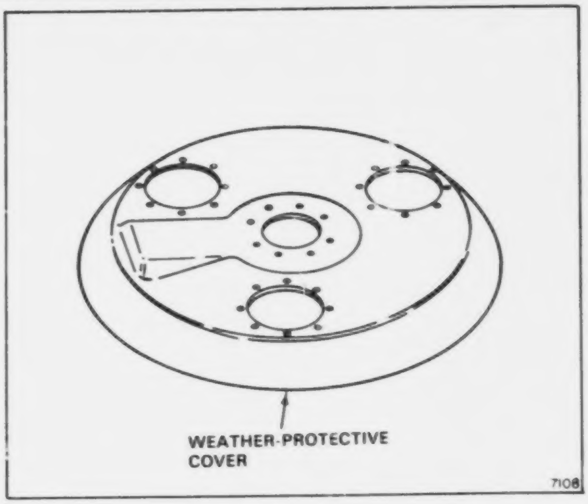
Airframe Repairer Tool Kit, NSN 5180-00-323-4876
Pencil Compass
Straightedge
Heat Lamp
Scissors
Trip Balance, NSN 6670-00-401-7195
Electric Drill
Drill Bits
Shot Bags
C-Clamps
Plastic Squeeze Bottle (E366)
Vacuum Cleaner
Craftsman's Knife
Chisel
Vacuum Pump

Materials:

Abrasive Paper (E6 thru E9)
Acetone (E20)
Cloth (E120)
Peel Ply (E270)
Gloves (E186)
Glass Cloth (E130 and E132)
Teflon-Impregnated Fabric (E170)
Nomex Honeycomb Core (E150.3 or E150.1)
Fiberglass Laminate (E168.1)
Rubber Pad (E318)
Masking Tape (E388)
Sealing Tape (E396)
Nylon Tape (E390.1)
Aluminum Plate (E71)
Hypodermic Syringe (E380)
Adhesive (E27, E40, E41, or E47.1)
Hardener (E194.1)
Wood Spatula (E424)
Temperature Indicating Strips (E413)
Polyethylene Cup (E157)
Polyvinyl Sheet (E284)

Personnel Required:

Aircraft Structure Repairer
Inspector



References:

TM 55-1520-240-23P

Equipment Condition:

Off Helicopter Task
Pitch Link Boots Removed (Task 5-134)

General Safety Instructions:

WARNING

Acetone (E20) is extremely flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

WARNING

Adhesives (E27, E40, E41, and E47.1) are flammable and toxic. They can irritate skin and cause burns. Use only in well-ventilated area, away from heat and open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

GO TO NEXT PAGE

5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

1. Repair of composite weather-protective cover (1) includes the following procedures:

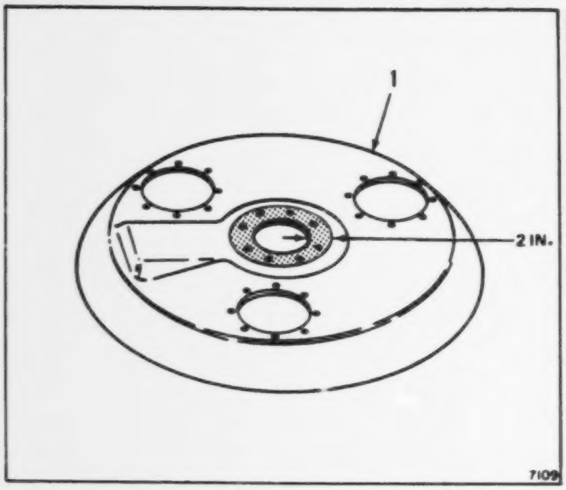
NOTE

Repair within 2 inches of center hole are not permitted.

Damage	Steps
Surface Abrasion	2-9
Edge Delamination	10-17
Bond Void (To 2 Square Inches)	18-28
Bond Void (Over 2 Square Inches)	29-58
Puncture Through One Skin and Core (To 1 Square Inch)	59-70
Puncture Through One Skin and Core (Over 1 Square Inch)	71-75
Puncture Through Both Skins and Core (To 1 Square Inch)	76-87
Puncture Through Both Skins and Core (Over 2 Square Inches)	88-105

NOTE

Procedure is same to repair forward or aft weather-protective cover.



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5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

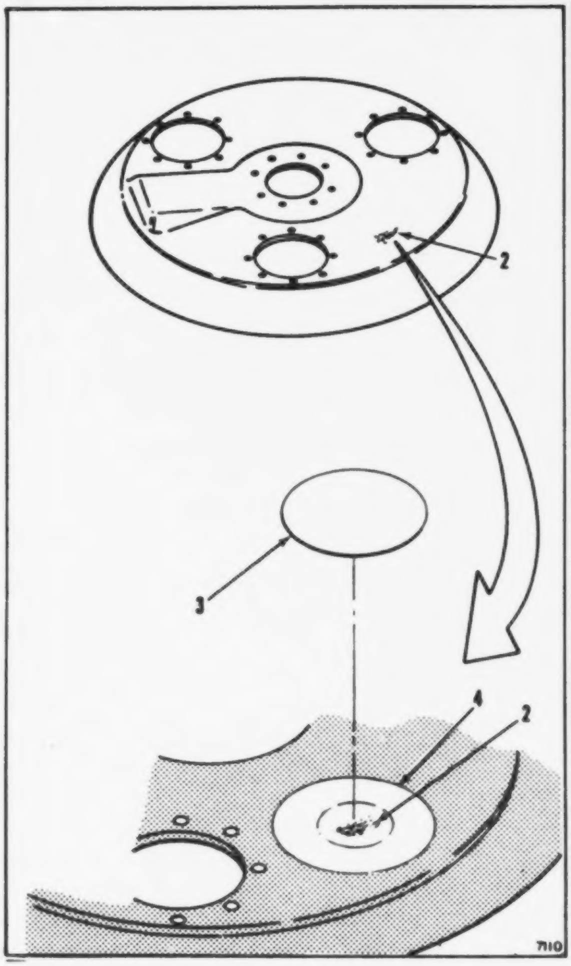
SURFACE ABRASION

2. **Outline area of damage (2)** with circle or oblong. Use pencil compass and straightedge.
3. Cut a piece of fiberglass laminate (E168.1) (3) large enough to overlap outline of damaged area (2) by 1.0 inch in all directions.

NOTE

Do not sand into glass fibers. Complete removal of primer is not necessary.

4. **Remove finish** down to primer from an area around damage (2) 1.5 inches larger in all directions than damage. Use abrasive paper (E8). Use cloths (E120) damp with acetone (E20) as needed to soften finish. Wear gloves (E186).
5. **Clean area of finish removal (4).** Use clean cloth (E120) damp with acetone (E20). Wipe area dry with a clean cloth. Repeat until there is no residue on dry cloth.
6. **Prepare adhesive mixture.** (Refer to steps 106. through 109.) Apply coat of adhesive to area of finish removal (4).
7. **Remove protective film** from both sides of laminate piece (3). Carefully pull at right angle to direction of fibers.
8. Apply coat of adhesive to underside of laminate piece (3). Center piece over damage (2) and press down.
9. **Bond and cure repair.** (Refer to steps 110. through 122.)



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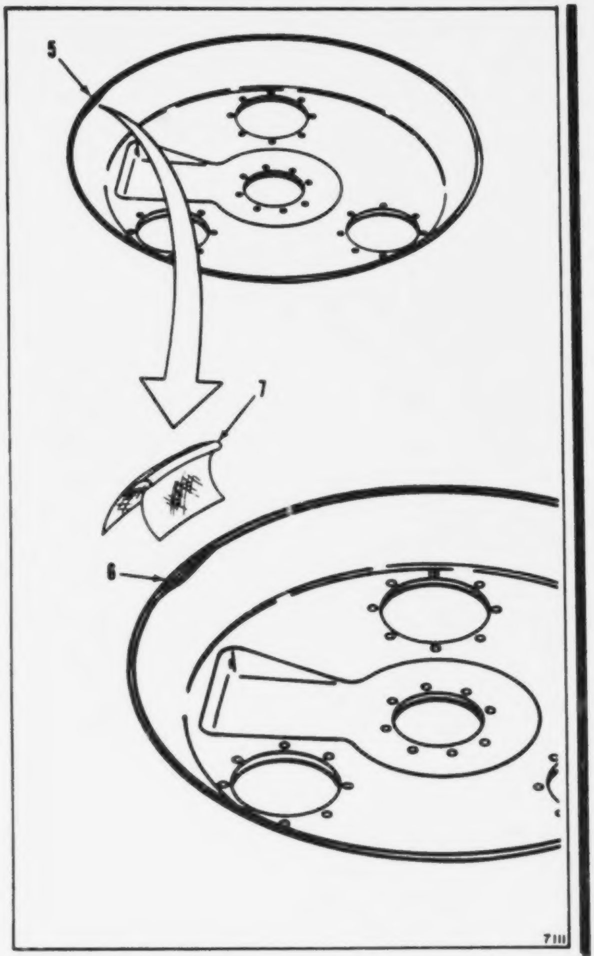
5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

EDGE DELAMINATION

10. **Clean delamination (5). Flush void (6)** with acetone (E20) from plastic squeeze bottle (E366). Allow to dry for 15 minutes.
11. **Prepare adhesive mixture.** (Refer to steps 105 through 108.)
12. **Fill void (6) with adhesive.** Use a length of clean shim stock to work adhesive into void. Fill deepest part of void first to avoid trapping air.
13. **Close void (6)** by hand. Remove adhesive squeezeout. Use cloth (E120).
14. **Cover void (6) with peel ply (E270) (7).** Maintain pressure on closed void. Use clamps at light pressure.



CAUTION

Do not heat cover surface over 160°F (71°C). Higher temperatures can damage cover.

15. **Cure adhesive** at 150°F to 160°F (66°C to 71°C) for 2 hours. Use heat lamp. Monitor temperature with temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70°F to 80°F (21°C to 27°C) in 24 hours. Pressure may be removed after 12 hours.

16. Remove clamps and peel ply (7).

INSPECT

17. Go to FOLLOW-ON MAINTENANCE.

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5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

BOND VOID (TO 2 SQUARE INCHES)

18. **Determine extent of void (8)** by tapping area with coin. Outline area of void with circle or oblong. Use pencil compass and straightedge.

NOTE

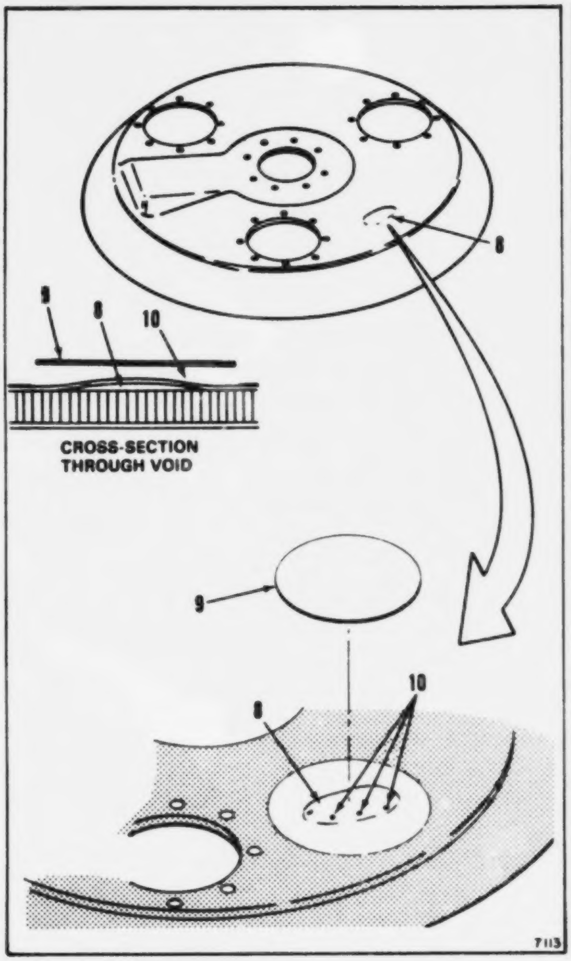
If area of void is greater than 2 square inches, go to step 40.

19. Cut a piece of fiberglass laminate (E168.1) (9) large enough to overlap outline of void (8) by 1.0 inch in all directions.

NOTE

Do not sand into glass fibers. Complete removal of primer is not necessary.

20. **Remove finish** down to primer from an area 1.5 inches larger in all directions than outline of void (8). Use abrasive paper (E8). Use cloths (E120) damp with acetone (E20) as needed to soften finish. Wear gloves (E186).
21. **Drill several small holes (10)** through void (8) near edge. Use a number 30 or 40 drill.
22. **Clean area** with a clean cloth (E120) damp with acetone (E20). Wipe area dry with clean dry cloth.
23. **Prepare mixture of adhesive.** (Refer to steps 106. through 109.) **Inject adhesive into void (8)** through holes (10) until void is full. Use hypodermic syringe (E380).
24. Cover holes (10) with tape (E390.1). Turn cover (1) over to prevent adhesive from running into core.
25. **Press down firmly on void (8).** Let excess adhesive squeeze out through holes (10).
26. **Remove protective film** from both sides of laminate piece (9). Carefully pull at right angle to direction of fibers.
27. Apply coat of adhesive to underside of laminate piece (9). Center piece over void (8) and press down.
28. **Bond and cure repair.** (Refer to steps 110. through 122.)



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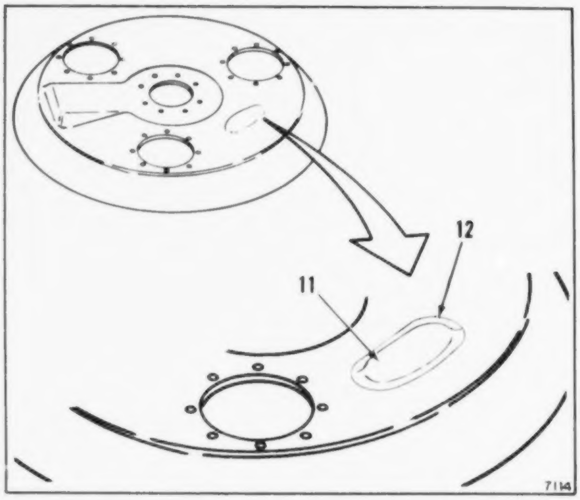
5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

BOND VOID (OVER 2 SQUARE INCHES)

29. **Determine extent of void (11)** by tapping area with coin. **Outline area (12)** of void with a circle or oblong. Use pencil compass or straightedge.

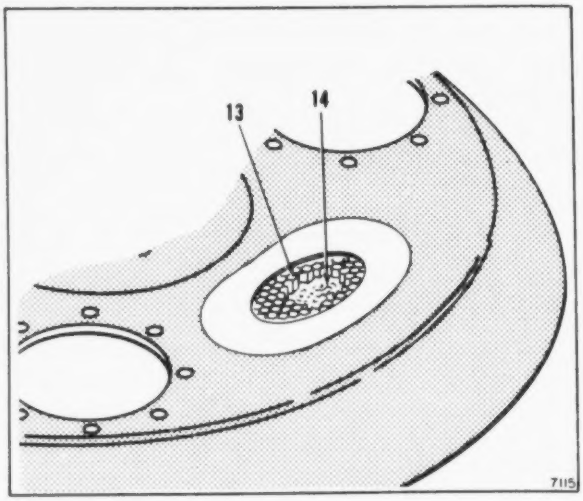


NOTE

Do not sand into glass fibers. Complete removal of primer is not necessary.

30. **Remove finish** to primer from an area 1.5 inches larger in all directions than outline (12). Use abrasive paper (E8). Use cloths (E120) damp with acetone (E20) as needed to soften finish. Wear gloves (E186).

31. **Cut away unbonded skin.** Use craftsman's knife.



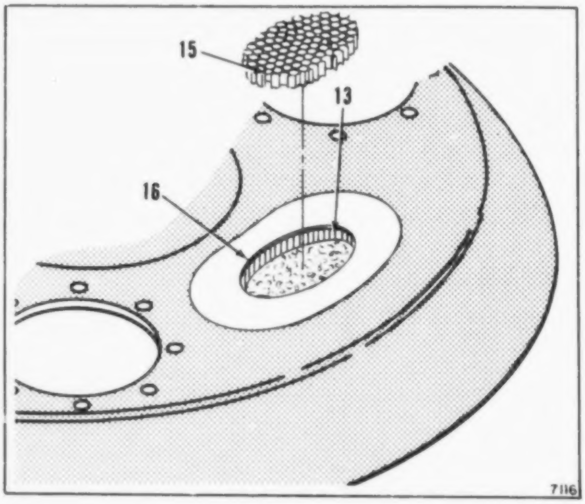
32. **Examine exposed core material (13).** If core is not damaged, clean the core and surrounding area with clean cloths (E120) damp with acetone (E20). Wipe dry with clean dry cloth. Go to step 47.

33. **If core (13) is damaged, cut out core to layer of adhesive on opposite skin (14).** Be careful not to damage skin. Use a chisel.

34. Roughen surface of adhesive on opposite skin (14) to remove gloss.

NOTE

Core material must be clean and dry for adhesive to hold.



35. **Cut core plug (15)** in shape of cavity (16) but 1/8 inch larger all around. Use core material (E150.3 or E150.1).

36. **Fit core plug (15)** into cavity (16). If plug does not protrude above level of existing core (13), go to step 43. If plug protrudes above level of core, go to step 37.

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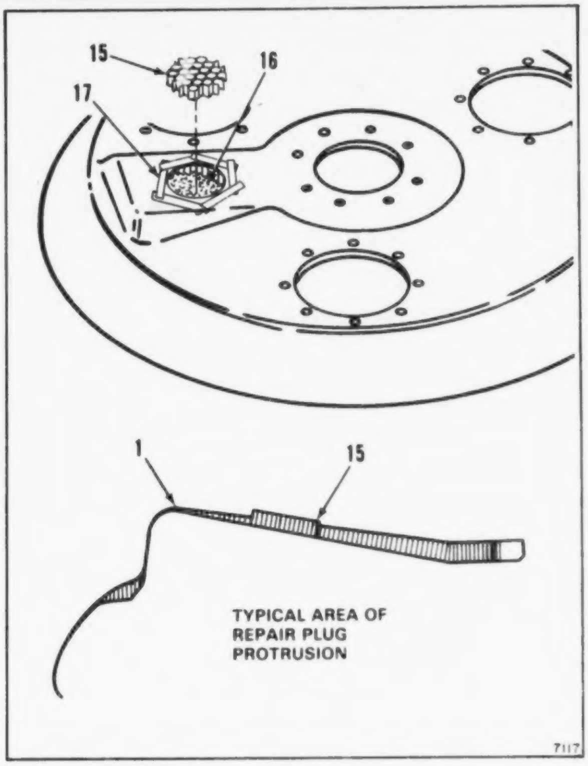
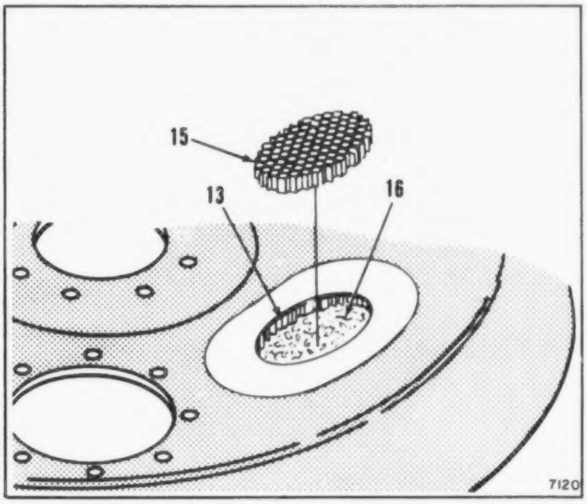
5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

37. **Apply nylon tape (E390.1) (17) around cavity (16). Sand core plug (15)** flush with tape. Use abrasive paper (E6) and sanding block long enough to span plug.
38. Remove tape (17). **Matchmark core plug (15)** to cover (1). Remove plug.
39. **Clean cavity (16),** surrounding area, and core plug (15). Use a vacuum cleaner and a clean cloth (E120) damp with acetone (E20). Wipe dry with a clean dry cloth. Repeat until there is no residue on dry cloth.
40. **Prepare mixture of adhesive.** (Refer to steps 106. through 109.) Apply coat of adhesive to sides and bottom of cavity (16).
41. **Apply** coat of **adhesive to** sides and bottom of **core plug (15).** Set plug in cavity (16). Align matchmarks if applicable.
42. Go to step 53.



43. **If core plug (15) is level with existing core (13), remove plug.**
44. **Clean cavity (16),** surrounding area, and core plug (15). Use a vacuum cleaner and a clean cloth (E120) damp with acetone (E20). Wipe dry with a clean dry cloth. Repeat until there is no residue on dry cloth.
45. **Prepare mixture of adhesive.** (Refer to steps 106. through 109.) Apply coat of adhesive to sides and bottom of cavity (16).
46. **Apply** coat of **adhesive to** sides and bottom of **core plug (15).** Set plug in cavity. Align matchmarks if applicable.



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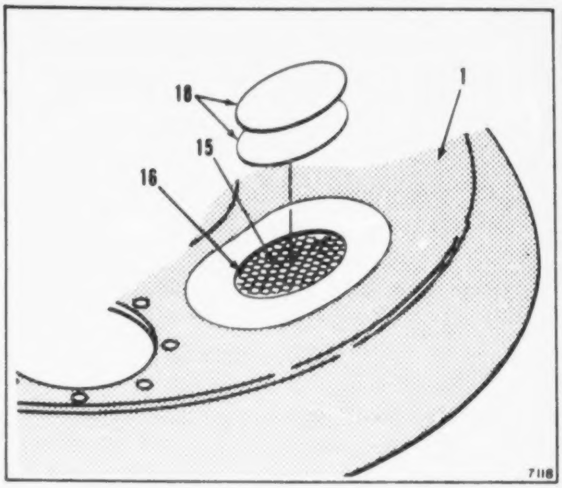
5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

47. Cut two pieces of fiberglass laminate (E168.1) (18) to fit in cavity (16) over core (15).
48. Check that pieces (18) fit flush with cover (1). Remove pieces.
49. **Remove protective film** from both sides of two laiminate pieces (18). Carefully pull at right angle to direction of fibers.
50. Prepare mixture of adhesive. (Refer to steps 106. thru 109.)
51. Coat underside of one piece (18) with adhesive. Press piece against plug (15) in cavity (16).
52. Apply coat of adhesive to top of installed piece (18) and underside of second piece. Install second piece in cavity over first piece. Press against piece to seat it flush with cover (1).



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5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

NOTE

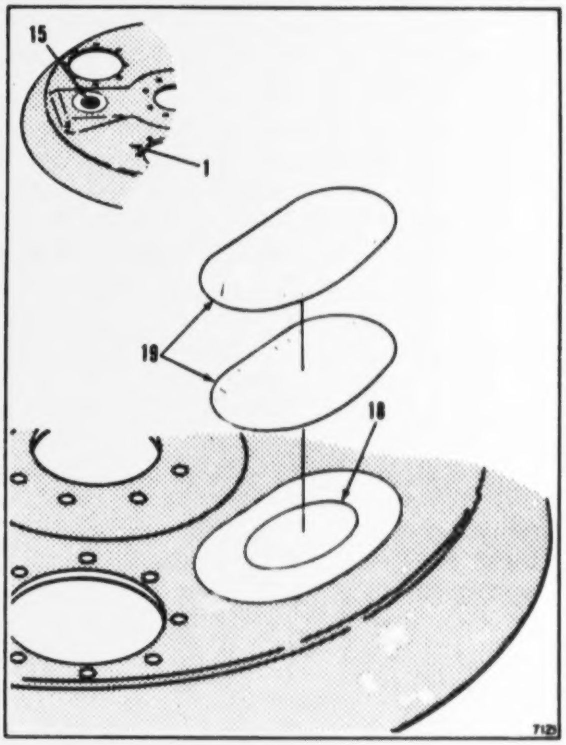
At this point, repair surface may consist of flush core or fiberglass laminate. Laminate shown.

53. Cut two pieces of fiberglass laminate (E168.1) (19) large enough to overlap core (15) or laminate piece (18) 1.0 inch in all directions. If cutout is not circular, cut pieces so that fiber orientation between pieces will be 45 degrees when they are installed.
54. **Apply** coat of **adhesive to** top of **laminate piece (18) or core plug (15), as applicable,** and to surrounding area of cover (1) to within 0.5 inch of finish removal line.
55. **Remove protective film from each side of two fiberglass laminate pieces (19). Carefully pull at right angle to direction of fibers.**

NOTE

Laminate pieces must be installed so that fiber orientation between the two pieces will be 45 degrees when they are installed.

56. Coat underside of one laminate piece (19) with adhesive. Center piece over repair area and press in place.
57. Apply adhesive to top of installed piece (19) and underside of second piece. Position second piece on first and press in place.
58. Bond and cure repair. (Refer to steps 110. through 122.)



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5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

PUNCTURE THROUGH ONE SKIN AND CORE (TO 1 SQUARE INCH)

59. **Outline area of puncture (20)** with circle or oblong. Use pencil compass and straightedge.
60. **Remove finish** down to primer from an area 1.5 inches larger in all directions than outline around puncture (20). Use abrasive paper (E8). Use cloths (E120) damp with acetone (E20) as needed to soften finish. Wear gloves (E186).
61. **Prepare mixture of adhesive.** (Refer to steps 106. through 109.) **Fill puncture (20)** with adhesive mixture to surface of cover (1).

CAUTION

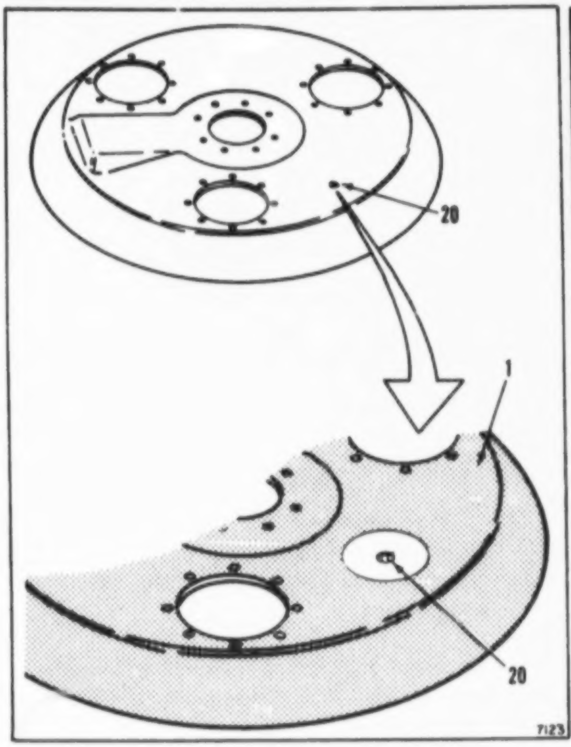
Do not heat cover surface over 160°F (71°C). Higher temperatures can damage cover.

62. **Cure adhesive** at 140°F to 160°F (60°C to 71°C) for 2 hours. Use heat lamp. Monitor temperature with temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70°F to 80°F (21°C to 27°C) in 24 hours.

63. **Fair cured adhesive** to surface of cover (1). Use abrasive paper (E9).
64. **Clean area** of finish removal. Use clean cloth (E120) damp with acetone (E20). Wipe area dry with clean dry cloth. Repeat until there is no residue on dry cloth.



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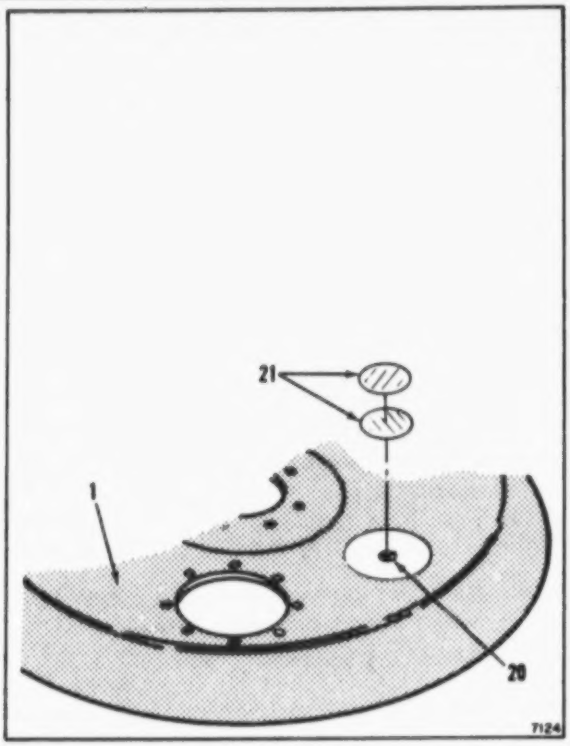
5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

65. Cut two pieces of fiberglass laminate (E168.1) (21) large enough to overlap puncture (20) 1.0 inch in all directions. If cutout is not circular, cut pieces so that fiber orientation between pieces will be 45 degrees when they are installed.
66. **Apply** coat of **adhesive to** top of **filled puncture (20)** and to surrounding area of cover (1) to within 0.5 inch of finish removal line.
67. **Remove protective film** from each side of two fiberglass laminate pieces (21). Carefully pull at right angle to direction of fibers.

NOTE

Laminate pieces must be installed so that fiber orientation between the two pieces will be 45 degrees when they are installed.

68. Coat underside of one laminate piece (21) with adhesive. Center piece over repair area and press in place.
69. Apply adhesive to top of installed piece (21) and underside of second piece. Position second piece on first and press in place.
70. Bond and cure repair. (Refer to steps 110. thru 122.)



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5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

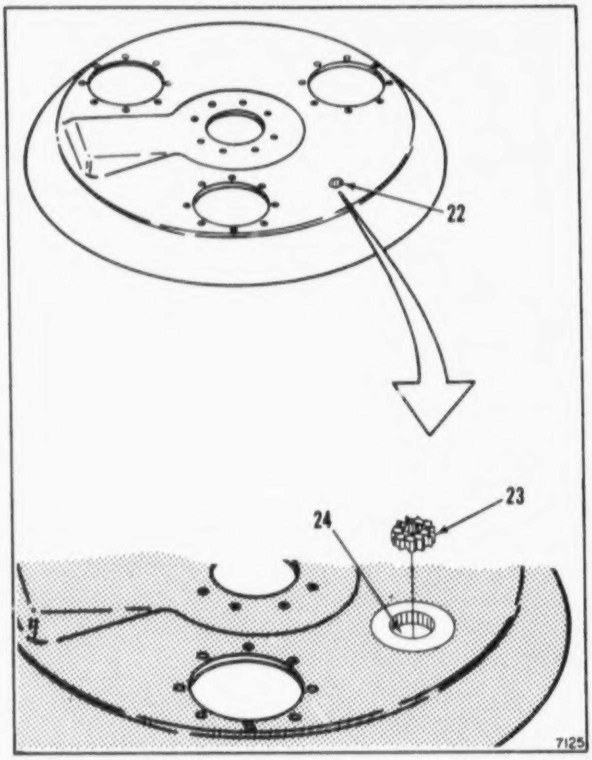
PUNCTURE THROUGH ONE SKIN AND CORE (OVER 2 SQUARE INCHES)

71. **Outline area of puncture (22)** with a circle or oblong. Use pencil compass and straightedge.

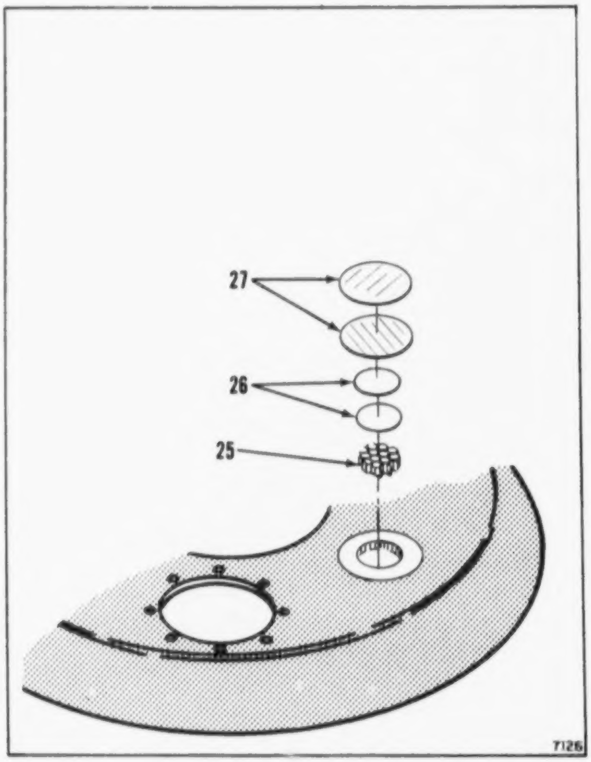
NOTE

Do not sand into glass fibers. Complete removal of primer is not necessary.

72. **Remove finish** to primer from an area 1.5 inches larger in all directions than outline. Use abrasive paper (E8). Use cloths (E120) damp with acetone (E20) as needed to soften finish. Wear gloves (E186).
73. **Cut out punctured skin and core plug (23)** to layer of adhesive on opposite skin (24). Use craftsman's knife and chisel. Be careful not to damage skin.
74. Roughen surface of adhesive on opposite skin (24) to remove gloss.



75. **Complete repair with core plug (25) and fiberglass laminate (26 and 27).** (Refer to steps 35 thru 58.)



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5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

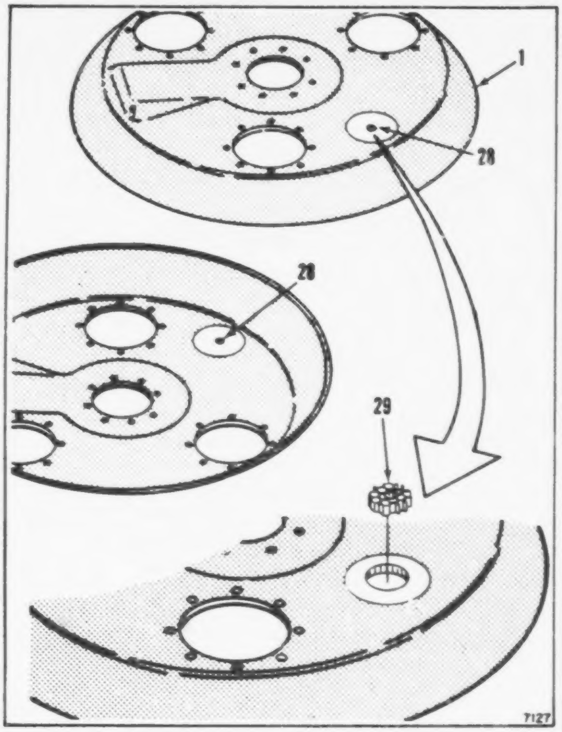
PUNCTURE THROUGH BOTH SKINS AND CORE (UP TO 2 SQUARE INCHES)

76. **Outline area of puncture (28)** on both sides of cover (1) with a circle or oblong. Use pencil compass and straightedge.

NOTE

Do not sand into giasss fibers. Complete removal of primer is not necessary.

77. **Remove finish** down to primer from an area on both sides of cover (1) 1.5 inches larger in all directions than outline. Use abrasive paper (E8). Use cloths (E120) damp with acetone (E20) as needed to soften finish. Wear gloves (E186).
78. **Cut out punctured skin and core plug (29)**. Work from both sides of cover (1) as needed. Use craftsman's knife.



79. **Cover cutout (30) on top of cover (1).** Use nylon tape (E390.1) (31).
80. **Prepare mixture of adhesive.** (Refer to steps 105. through 108.) **Fill cutout (30)** from bottom of cover (1) to bottom surface (32) with adhesive (33).

CAUTION

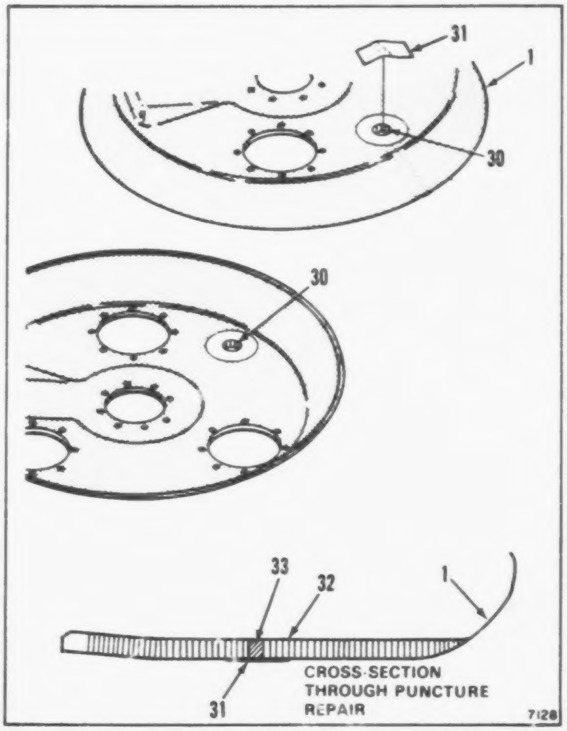
Do not heat cover surface over 160°F (71°C). Higher temperatures can damage cover.

81. **Cure adhesive** at 140°F to 160°F (60°C to 71°C) for 2 hours. Use heat lamp. Monitor temperature with temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70°F to 80°F (21°C to 27°C) in 24 hours.

82. Remove tape (31). Fair cured adhesive to cover surface on top and bottom of cover (1). Use abrasive paper (E9).



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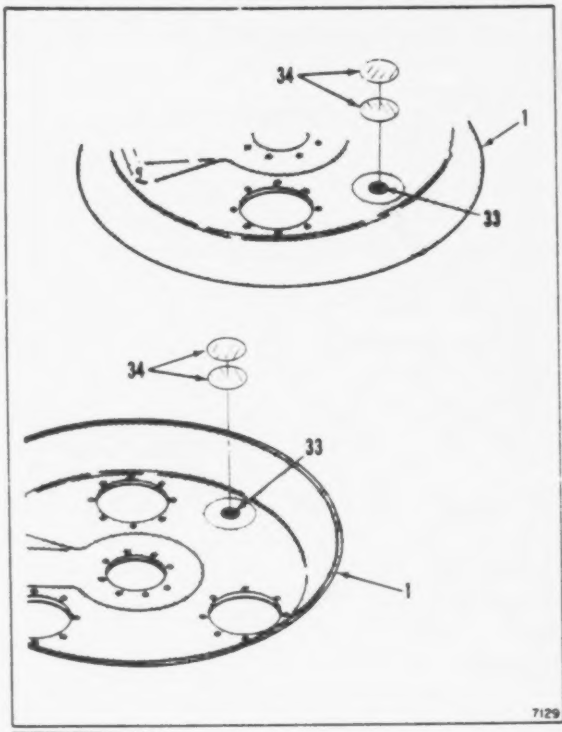
5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

83. **Clean area of finish removal** on both sides of cover (1). Use clean cloths (E120) damp with acetone (E20). Wipe area dry with clean dry cloth. Repeat until there is no residue on dry cloth.
84. **Cut two pieces of fiberglass laminate (E168.1) (34)** for each side of cover (1) large enough to overlap adhesive (33) 1.0 inch in all directions.
85. **Prepare new mixture of adhesive.** (Refer to steps 106. through 109.)
86. **Cover each side of puncture repair** as follows:
    a. Apply a coat of adhesive to cured adhesive (33) and area of finish removal.
    b. **Remove protective film from each side of two fiberglass laminate pieces (34). Carefully pull at right angle to direction of fibers.**
    c. Center one piece (34) over repair. Press down against cover (1).
    d. Apply adhesive over installed piece (34). Position second piece on installed piece so that fiber orientation between pieces is 45 degrees . Press down against installed piece.
87. **Bond and cure repair.** (Refer to steps 110. through 122.)



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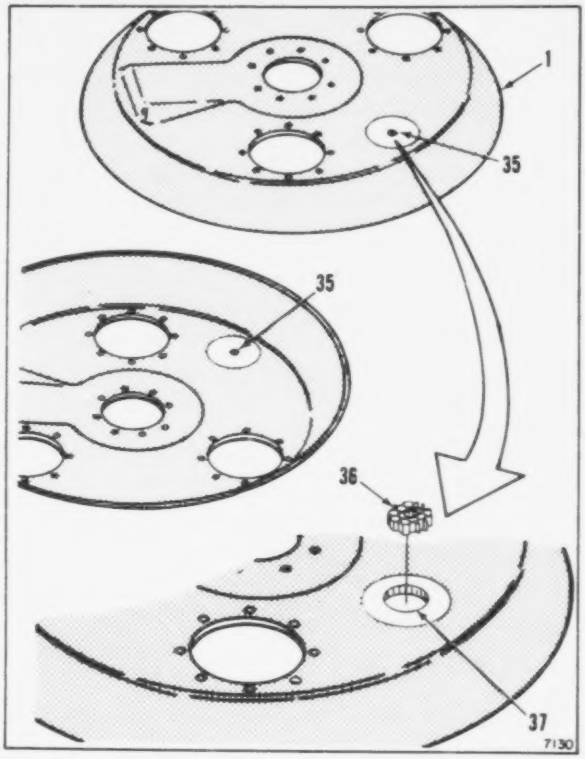
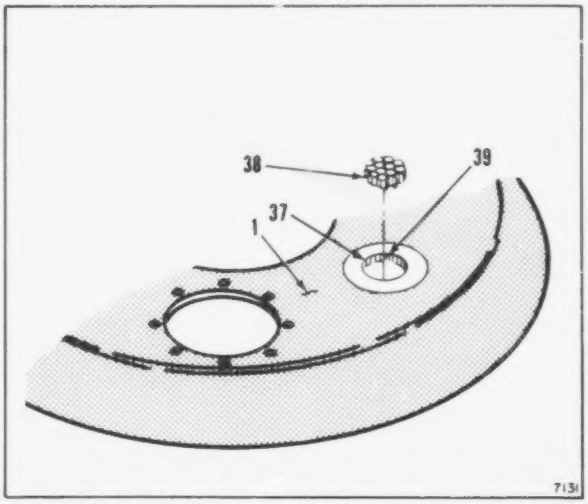
5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

PUNCTURE THROUGH BOTH SKINS AND CORE (OVER 2 SQUARE INCHES)

88. **Outline area of puncture (35)** on both sides of cover (1) with a circle or oblong. Use pencil compass and straightedge.
89. **Remove finish** from an area **on both sides** of cover (1) 1.5 inches larger in all directions than puncture (35). Use abrasive paper (E8). Use cloths (E120) damp with acetone (E20) as needed to soften finish. Wear gloves (E186).
90. **Remove punctured skin and core plug (36) from cutout (37).** Work from both sides of cover (1) as needed. Use craftsman's knife.



91. **Cut new core plug (38)** in shape of cutout (37) but 1/8 inch larger all around. Use core material (E150.3).
92. **Fit core plug (38)** into cutout (37). **If plug is same height** as surrounding core (39), **go to step 97. If plug protrudes** beyond thickness of cover (1), **go to step 93.**



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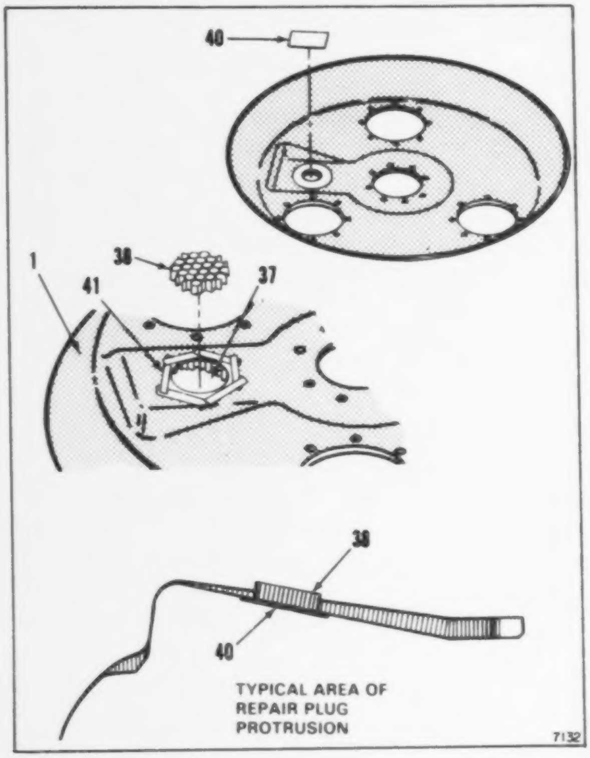
5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

93. **Remove plug (38)** from cutout (37). **Tape an aluminum plate (E71) (40) against cutout** on underside of cover (1). Use nylon tape (E390.1).

94. **Apply nylon tape (E390.1) (41)** around cutout (37) on top side of cover (1). **Install core plug (38)** in cutout against aluminum plate (40). **Sand plug flush** with tape. Use abrasive paper (E6) and sanding block long enough to span plug.

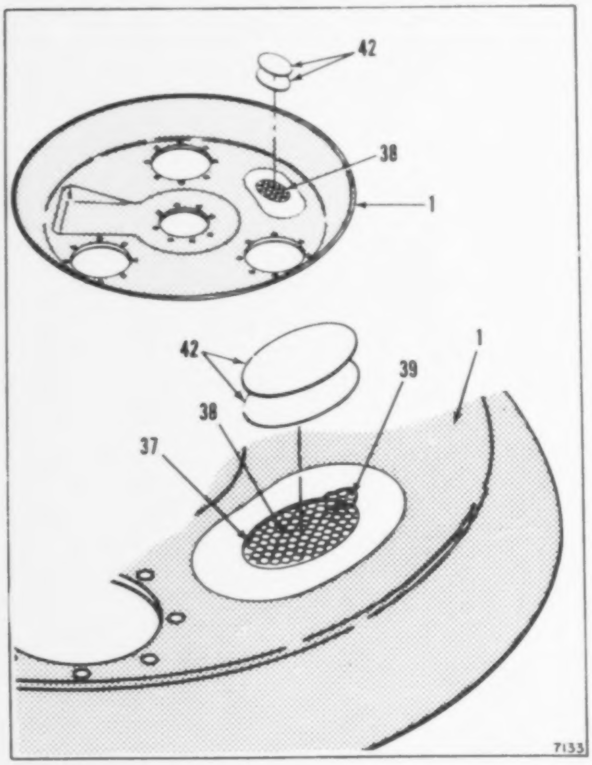
95. Remove tape (41). **Matchmark core plug (38)** to cover (1). Remove plug.

96. Go to step 99.



97. **If core plug (38) is same height** as surrounding core (39), **cut two pieces of fiberglass laminate (E168.1) (42)** to fit cutout (37) at top and bottom of cover (1).

98. Check that pieces of laminate (E168.1) (42) fit against installed core plug (38) flush with cover (1) on both sides. Remove laminate and plug.



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5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

99. **Cut two pieces of fiberglass laminate (E168.1) (43)** for each side of cover (1) large enough to overlap cutout (37) 1.0 inch in all directions. If cutout is not circular, cut pieces so that fiber orientation between pieces will be 45 degrees when they are in position.

100. **Clean cutout (37)** and surrounding area, core plug (38), and laminate (42) (if applicable). Use clean cloths (E120) damp with acetone (E20). Wipe dry with a clean dry cloth. Repeat until there is no residue on dry cloth.

101. **Prepare mixture of adhesive.** (Refer to steps 106. through 109.)

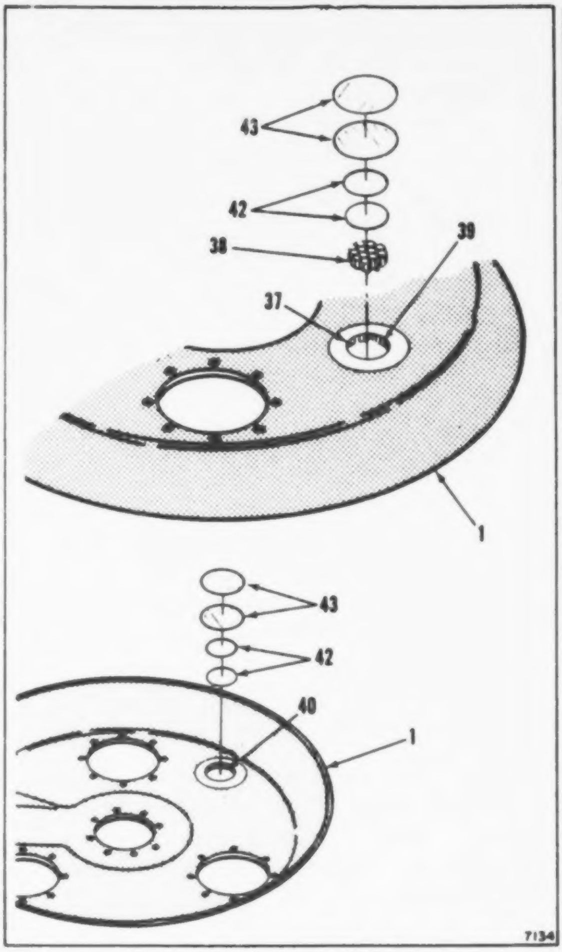
102. **Apply coat of adhesive** to sides of core plug (38). **Set plug in cutout (37)** flush with surrounding core (39) or top and bottom surfaces of cover (1), as applicable. **Align matchmarks, if applicable.**

103. If laminate pieces (42) are needed for filler, install over core (38) on each side of cover as follows:

    a. **Remove protective film** from each side of two fiberglass laminate pieces (42). Carefully pull at right angle to direction of fibers.

    b. Apply a coat of adhesive to underside or one installed piece (42). Press piece against plug (38).

    c. Apply coat of adhesive to top of installed piece (42) and underside of second piece. Press against second piece to firmly seat flush with surrounding skin of cover (1).



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5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

104. **Cover each side of repair** as follows:

   a. Apply coat of adhesive to top of laminate piece (42) or core plug (38), as applicable, and to surrounding area of cover (1) within 0.5 inch of finish removal line.

   b. **Remove protective film** from each side of two fiberglass laminate pieces (43). Carefully pull at right angle to direction of fibers.

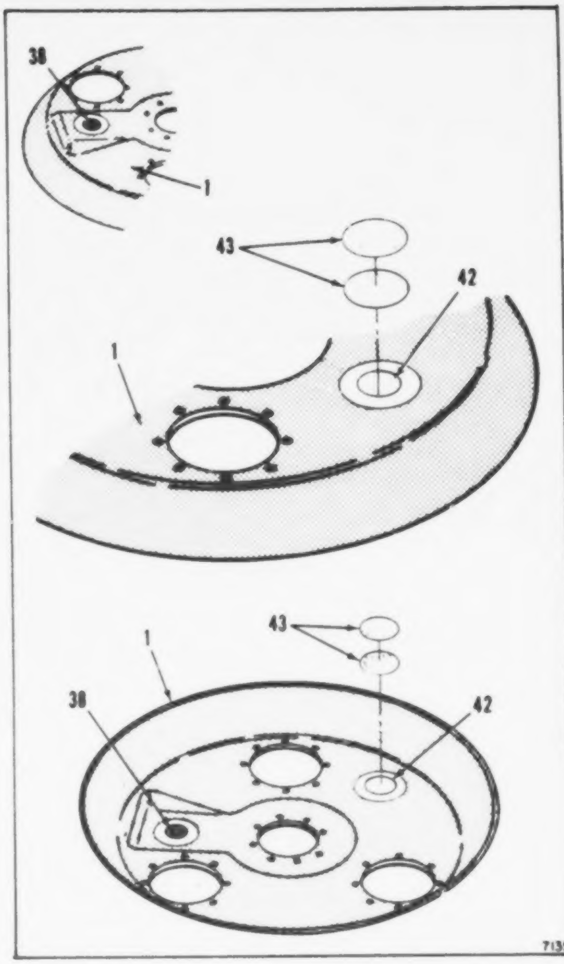
NOTE

Laminate pieces must be installed so that fiber orientation between the two pieces will be at 45 degrees when the pieces are installed.

   c. **Coat underside** of one laminate piece (43) with adhesive. Center piece over repair area and **press ir place.**

   d. Apply **coat** of adhesive to **top of installed piece (43) and underside of second piece.** Position second piece on first piece and **press it in place.**

105. **Bond and cure repair.** (Refer to steps 110. thru 122.)



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5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

ADHESIVE PREPARATION

106. Use any of three adhesive mixtures for repair of weather-protective cover.

NOTE

All three adhesives cure in 2 hours at 150°F to 160°F (66°C to 71°C). A serviceable cure can be achieved at 70°F to 80°F (21°C to 27°C) in 24 hours. Pressure may be removed after 2 hours.

107. Mix adhesive EA9309.3NA (E40 or E41) as follows:

NOTE

Prepackaged adhesive (E40) is preferred. Use adhesive (E41) only if prepackaged kit is not available.

a. Mix tube of adhesive (E40) according to instructions on kit.

b. Prepare adhesive (E41) as follows:

   (1) Weigh 100 parts of resin (pink paste) and 23 parts of hardener (blue liquid). Use trip balance.

   (2) Mix parts in polyethylene cup (E157) until color is uniform dark pink. Use wood spatula (E424).

NOTE

Working life of adhesive (E41) is 30 minutes.

108. Mix adhesive EC-2216 (E27) as follows:

a. Weigh 7 parts of Part A hardener (grey paste and 5 parts of Part B base (cream paste). Use trip balance.

b. Mix parts in polyethylene cup (E157) until color is uniform medium grey. Use wood spatula.

NOTE

Working life of adhesive (E43) is 1 to 2 hours.

109. Mix adhesive EPON 828 (E47.1) and hardener Versamid 125 (E194.1) as follows:

a. Weigh equal parts of adhesive (light amber resin) and hardener (dark amber resin). Use trip balance.

b. Mix parts in polyethylene cup (E157) until color is uniform. Use wood spatula (E424).

NOTE

Working life of adhesive is 1 hour.

GO TO NEXT PAGE

5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1

BOND AND CURE REPAIR

110. **Cover repair (44) with sheet of peel ply** (E270) (45) **and** sheet of **teflon-impregnated fabric (E170)** (46). Each sheet shall be large enough to overlap repair 1 inch in all directions.

111. **Cover teflon-impregnated fabric** (E170) (46) **with rubber pad** (E318) (47). **Cover rubber pad with glass cloth** (E132) (48).

112. **Surround cloth** (E132) (48) **with** border (49) of **sealing tape** (E396). Keep tape clear of cloth.

113. **Attach tube** (50) to vacuum pump hose. **Wrap end of tube** with two layers of glass cloth (E132) (51). Secure cloth to tube with masking tape (E388) (52).

114. **Place tube (50) on glass cloth** (E132) (48). **Wrap tube with sealing tape** (E396) (52) where tube crosses border (49) of sealing tape (E396).

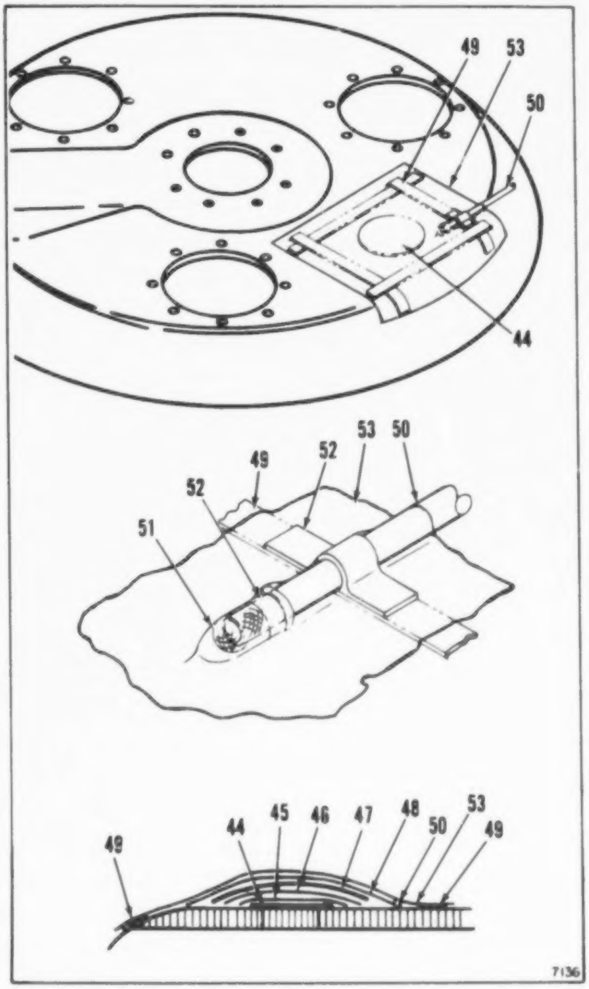
115. Press tube (50) against tape (49 and 52) to make an airtight seal. Check that glass cloth (51) on end of tube (50) is in direct contact with layer of glass cloth (48).

116. **Cover area with polyvinyl sheet** (E284) (53). Press sheet smoothly against tape (49) to make an airtight seal.

117. **Start vacuum pump.** Set pump for vacuum of about 30 inches Hg.

118. Shut off pump. Vacuum shall not drop more than 5 inches Hg in 5 minutes. Reposition polyvinyl sheet (53) or add tape (E396) (49 or 52) as needed.

119. Start pump again. Maintain vacuum of at least 20 inches Hg throughout adhesive cure.



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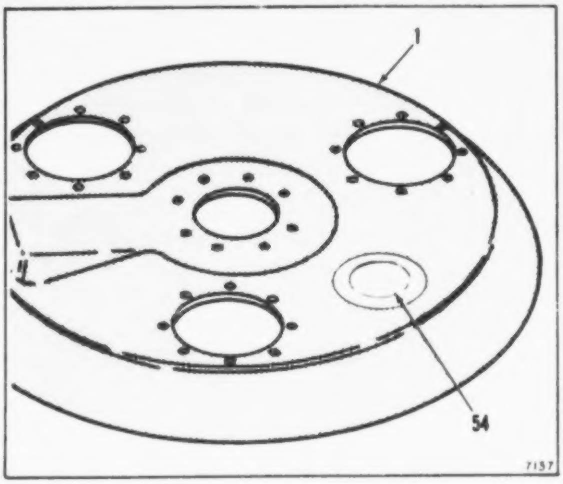
5-137.1 REPAIR COMPOSITE WEATHER-PROTECTIVE COVER (AVIM) (Continued) 5-137.1



CAUTION

Do not exceed 160°F (71°C) at surface of cover. Damage to cover can occur.

120. Cure adhesive at 140°F to 160°F (60°C to 71°C) for 2 hours. Use heat lamp. Monitor temperature with temperature indicating strips (E413).

NOTE

Serviceable cure can be achieved without heat at 70°F to 80°F (21°C to 27°C) in 24 hours. Vacuum may be removed after 2 hours.

121. Turn off vacuum pump. Remove vacuum bagging materials.
122. Chamfer circumference of fiberglass laminate patch (54). Fair adhesive squeezeout to cover (1) if needed. Use abrasive paper (E7).

INSPECT

FOLLOW-ON MAINTENANCE:

Refinish repaired area (Task 5-82).

END OF TASK

5-138 INSTALL WEATHER PROTECTIVE COVER 5-138

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692
Torque Wrench, 30 to 150 Inch-Pounds

Materials:

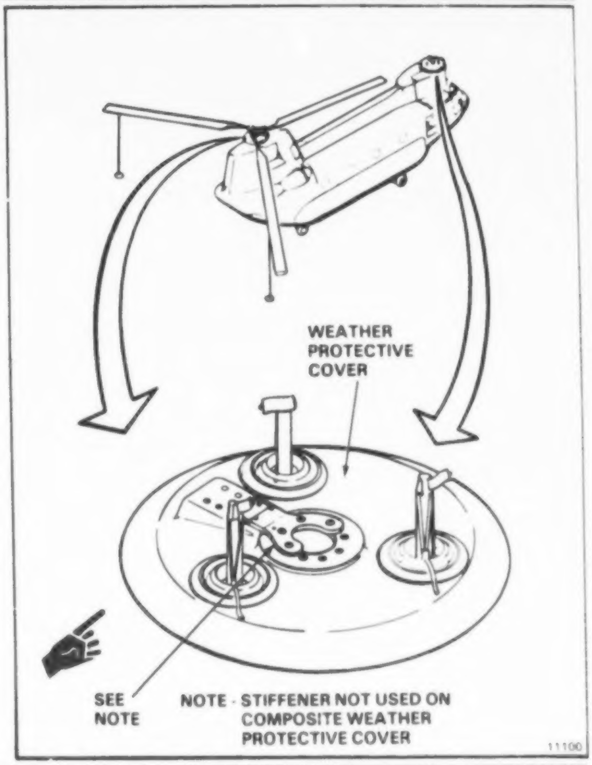
Toluene (E423)
Twine (E433) or Straps (E374)
Sealant (E336)
Cloth (E120)
Gloves (E186)

Personnel Required:

Medium Helicopter Repairer (2)
Inspector

References:

TM 55-1520-240-23P



NOTE - STIFFENER NOT USED ON COMPOSITE WEATHER PROTECTIVE COVER

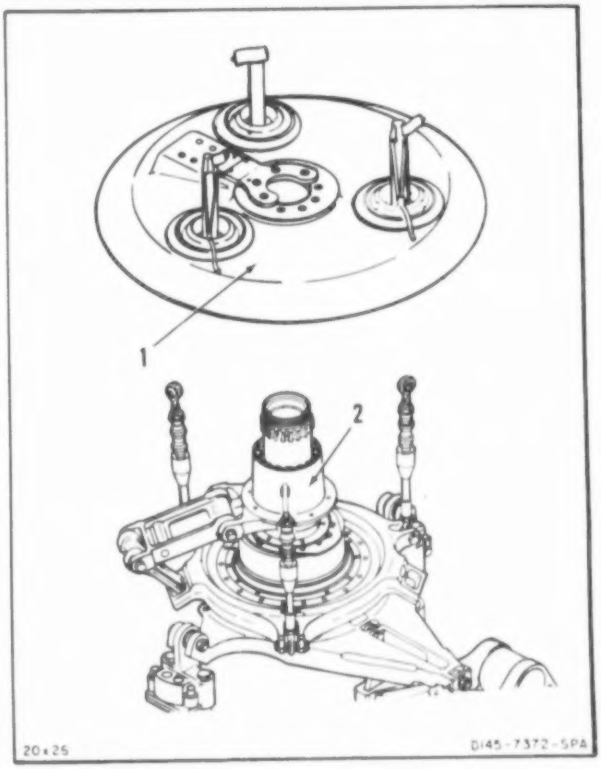
WARNING

Toluene (E423) can form toxic vapors if exposed to flame. Use in well-ventilated area, away from open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

NOTE

Procedure is similar to install forward or aft weather protective cover. Differences are noted in text.

1. Clean mating surfaces of weather protective cover (1) and drive collar (2). Use cloth (E120) damp with toluene (E423). Wear gloves (E186).



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5-138 INSTALL WEATHER PROTECTIVE COVER (Continued) 5-138

2. **Install weather protective cover (1)** as follows:

   a. Position raised section (3) of cover (1) over drive arms (4).

   b. Lower cover (1) slowly guiding three pitch links (5) through boots (6).

   NOTE

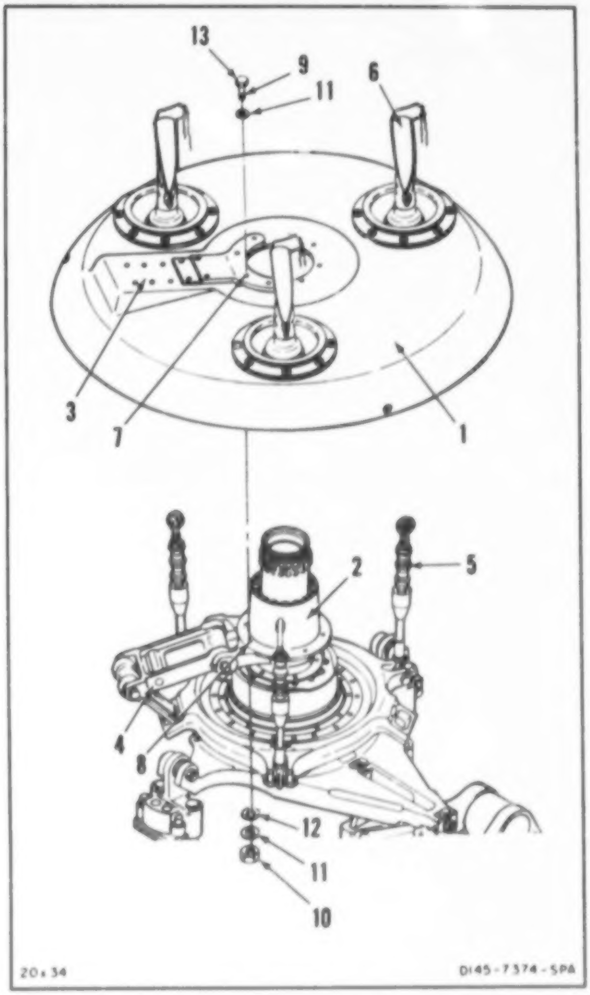
   Holes are not equally spaced.

   c. Align holes (7) in cover (1) with holes (8) in drive collar (2).

   d. Install 8 bolts (9), 8 nuts (10), and 24 washers (11 and 12). Install bolts with head (13) up and one washer (11) under head. **Torque bolts to 100 inch-pounds.**

   NOTE

   Three rivets (formerly used for phasing) are installed on the outer rim of the weather protective covers. If the word PHASING is stenciled on the cover, paint over with black lusterless paint (E215).

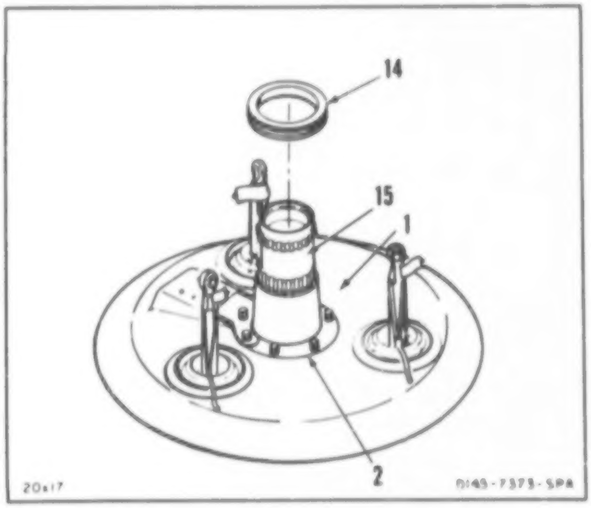


WARNING

Sealant (E336) can irritate skin and cause burns. Avoid contact with skin, eyes, and clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. **Apply sealant (E336)** at junction of drive collar (2) and cover (1). Wear gloves (E186).

4. For forward cover (1) only, **install spacer (14)** on drive shaft (15). Then go to step 6.



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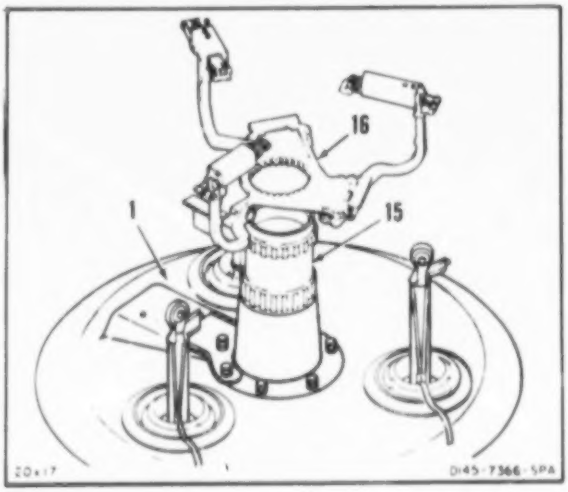
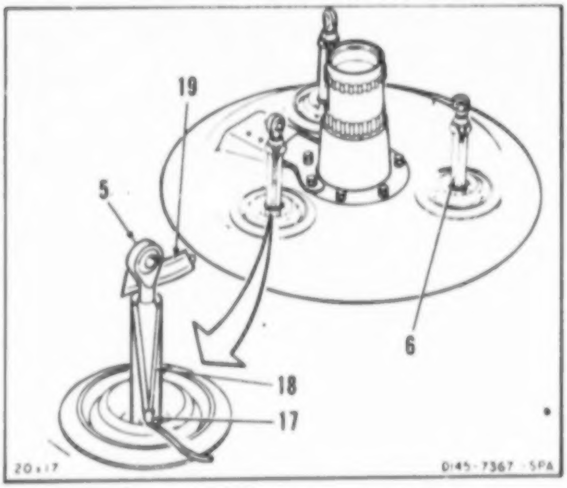
5-138 INSTALL WEATHER PROTECTIVE COVER (Continued) 5-138

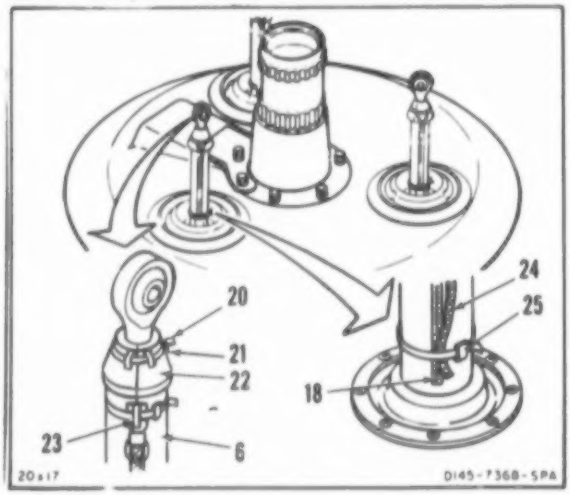
5. For aft cover (1) only, install **centrifugal droop stop (16)** on drive shaft (15).


16
1
15
20x17
D145-7366-SPA

6. **Pull tab (17) of interlocking slide fastener (zipper) (18) all the way up** on three pitch link boots (6).
7. **Close cones (19)** around pitch links (5).

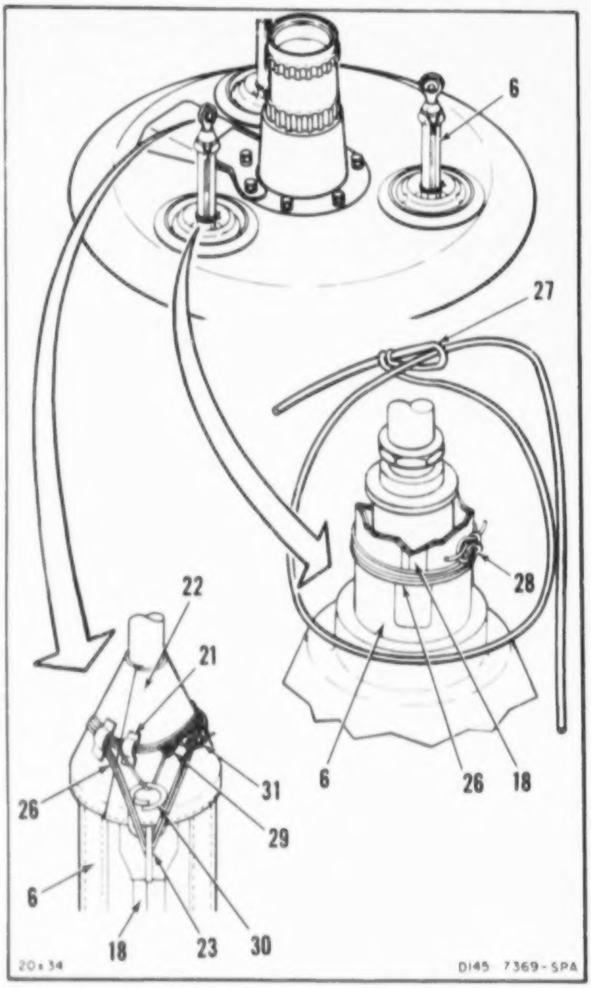

19
5
6
18
17
20x17
D145-7367-SPA

8. If using straps (E374) (20) **secure three pitch link boots (6)** as follows:
   a. Install upper strap (E374) (20) through tabs on cones (19).
   b. Install middle strap (E374) (20) through zipper slider (23).
   c. Install lower strap (E374) (20) at bottom of zipper (18) over zipper pull (24).
   d. Cut-off straps (20) 1/4-inch from locks (25).


24
20
25
21
22
18
23
6
20x17
D145-7368-SPA

GO TO NEXT PAGE

9. If using twine (E433) (26) **secure three pitch link boots (6)** as follows:
   a. Cut six 24-inch lengths of twine (E433) (26).
   b. Tie a 1-inch loop (27) 6 inches from one end of twine (E433) (26) 24 inches in length.
   c. Pass long end of twine (E433) (26) around boot (6) at bottom of zipper (18), and through loop (27).
   d. Pull twine (E433) (26) tight and wrap around boot (6) four times. Apply enough tension to prevent boot (6) from sliding.
   e. Tie ends of twine (E433) (26) together with double square knot (28).
   f. Cut off ends of twine (E433) (26) 1/4-inch from knot (28).
   g. Pass end of another 24-inch length of twine (E433) (26) around cone (22) through loops (21) three times.
   h. Pull ends of twine tight (E433) (26) and tie together with square knot (29).
   i. Pass long end of twine (E433) (26) through tab (30) of zipper (18), then through loops (21) around cone (22).
   j. Pass twine (E433) (26) down through zipper slider (23) and back through loops (21) around cone (22).
   k. Pull ends of twine tight (E433) (26) and tie together with double square knot (31).
   l. Cut off twine (E433) (26) 1/4-inch from knot (31).
   m. Repeat a. through l. for two remaining boots (6).



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5-138 INSTALL WEATHER PROTECTIVE COVER (Continued) 5-138

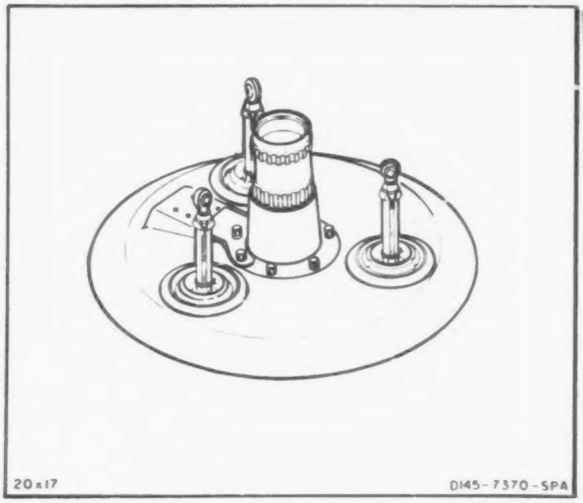
INSPECT

FOLLOW-ON MAINTENANCE:

Rotary-wing head installed (Task 5-9).

Rotary-wing blades installed (Task 5-84).

Work platforms closed (Task 2-2).



END OF TASK

SECTION VI

BLADE TRACKING

5-139 PREPARE FOR TRACKING AND BALANCING 5-139

INITIAL SETUP

Applicable Configurations:

All

Tools:

Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692

Strobex Blade Tracker 135M-11

Vibrex Accessory Kit 114G0019-1

Vibrex Balancer 177M-6A

Materials:

Lockwire (E233)

Lockwire (E231)

Personnel Required:

67U20 Medium Helicopter Repairer (2)

67U30 Inspector

Equipment Condition:

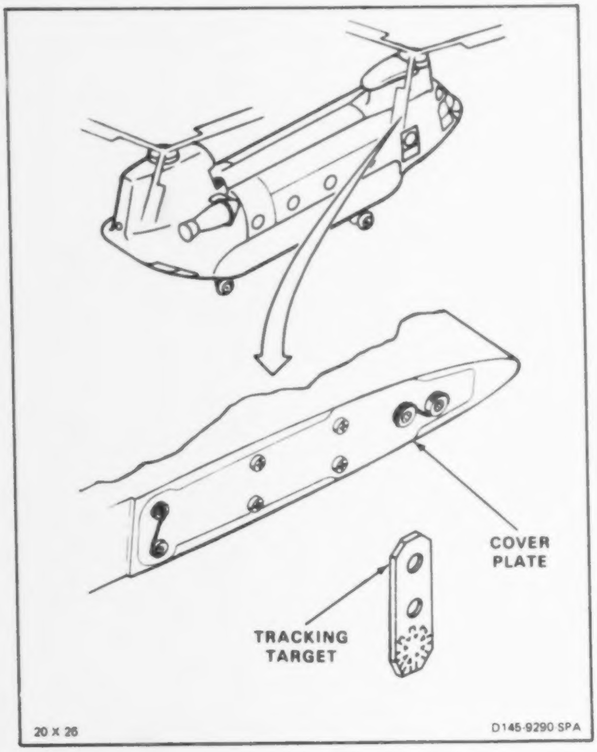
Battery Disconnected (Task 1-39)

Electrical Power Off

Hydraulic Power Off

Tiedown Lines Connected to One Forward and One Aft Rotary-Wing Blade (Task 1-26)

Forward and Pylon Work Platforms Open (Task 2-2)



NOTE

Procedure is same to prepare forward or aft blades for ground tracking.

1. **Install serviceable reflective tape strips (1) on tracking targets (2, 3, and 4)** as follows:

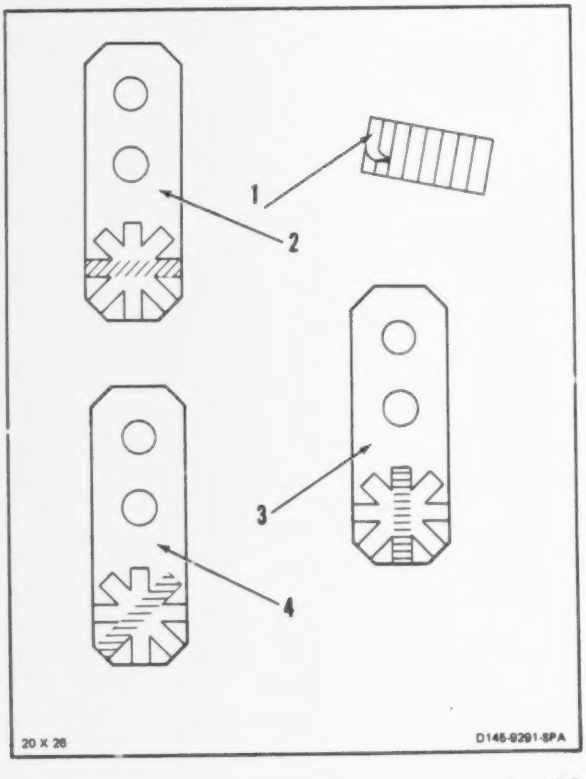
NOTE

Green blade is on pitch housing with green band. Red blade is on pitch housing with red band. Yellow blade is on pitch housing with yellow band.

a. For a red blade, peel off tape strip (1). Press into horizontal etched area of target (2).

b. For a green blade, peel off tape strip (1). Press into vertical etched area of target (3).

c. For a yellow blade, peel off tape strip (1). Press into diagonal etched area of target (4).



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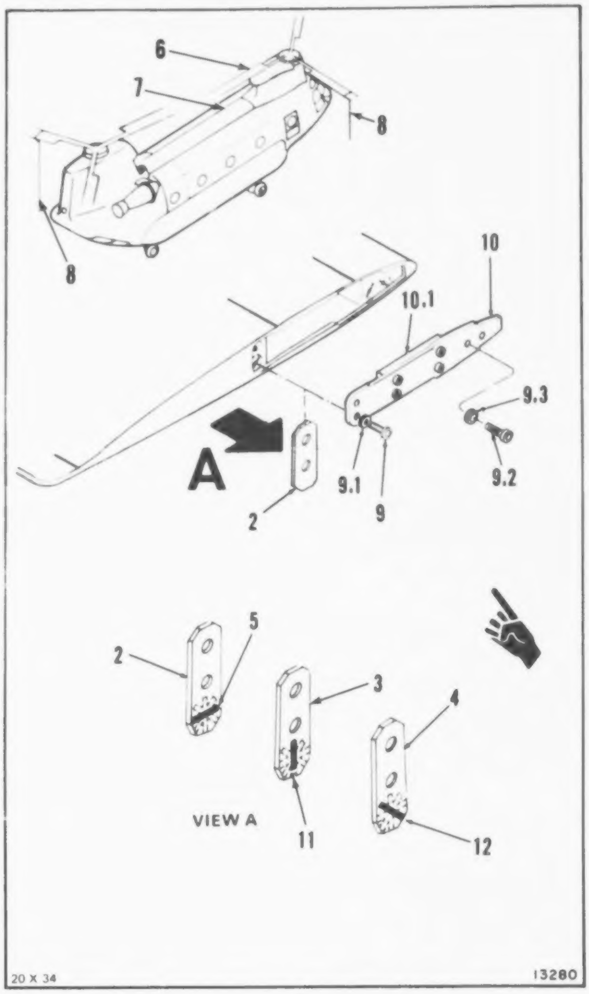
5-139 PREPARE FOR TRACKING AND BALANCING (Continued) 5-139

2. **Install target (2) with horizontal tape (5)** on forward red blade (6) as follows:
   - a. Position blade (6) over tunnel (7). Use tiedown lines (8).
   - b. Remove lockwire from two screws (9). Remove screws and washers (9.1).
   - c. If computer-aided tracking and balancing will be performed, do the following:
     - (1) Remove lockwire from two screws (9.2). Remove screws and washers (9.3).
     - (2) Remove cover plate (10).
     - (3) Count the number of balance weights (10.1). Record the number for each blade color.
     - (4) Install tip cover (10). Install two screws (9.2) and washers (9.3).
   - d. Position target (2) on tip cover (10) with tape (5) toward cover.
   - e. Install target (2) using two screws (9) and washers (9.1). **Torque screws (9) and, if applicable, (9.2) to 175 inch-pounds.**
   - f. Lockwire screws (9), and, if applicable, (9.2). Use lockwire (E233).
3. **Install target (3) with vertical tape (11)** on forward green blade (6). Follow procedure in step 2.
4. **Install target (4) with diagonal tape (12)** on forward yellow blade (6) Follow procedure in step 2.
5. Install targets (2, 3, and 4) on red, green, and yellow aft blades. Follow procedures in steps 2, 3, and 4.



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5-139 PREPARE FOR TRACKING AND BALANCING (Continued) 5-139

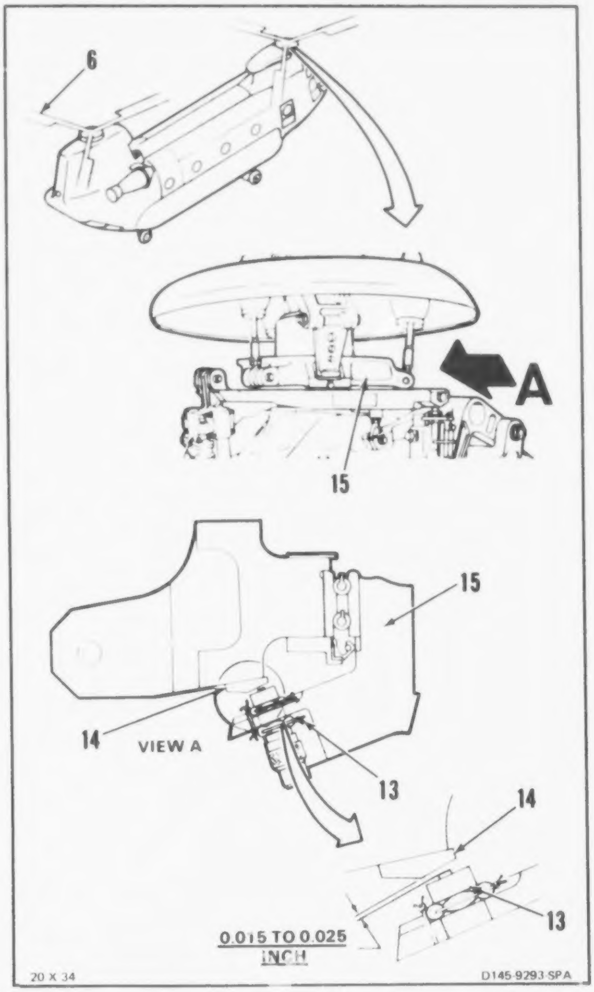
6. Check that phase detector (13) and three interrupter brackets (14) are attached securely to forward swashplate (15).

NOTE

Phase detector and three brackets are installed on forward swashplate only. One bracket has two interrupters.

7. Position brackets (14) over detector by turning blades (6). **Check clearance between each of three interrupter brackets and phase detector (13).** Clearance shall be 0.015 to 0.025 inch.

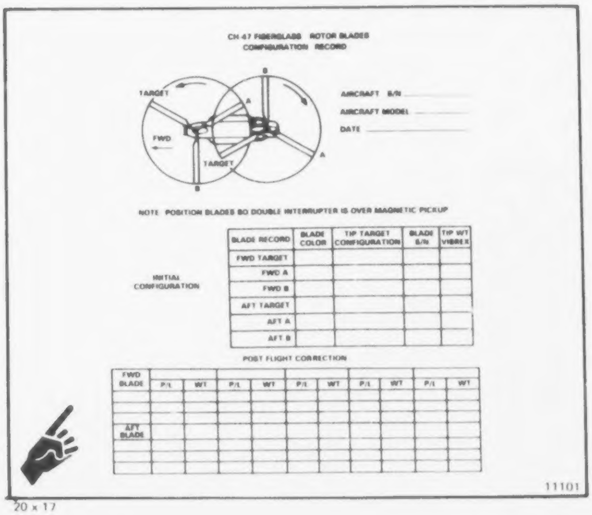
7.1. Turn blades (6) to position double interrupter over phase detector (13).



NOTE

Proper blade identification is necessary for correct blade tracking and balancing.

7.2. Record blade color (red, yellow, or green), tip target (▬ , ▮, or ▮), and serial number for each blade (A, B, or Target) on each rotor head. If computer-aided, tracking and balancing will be performed, record number of balance weights on each blade. (Refer to step 2.c.)


TARGET
A
B
FWD
TARGET
B
A
11101
20 x 17

CH-47 FIBERGLASS ROTOR BLADES
CONFIGURATION RECORD

AIRCRAFT S/N ____
AIRCRAFT MODEL ____
DATE ____

NOTE POSITION BLADES SO DOUBLE INTERRUPTER IS OVER MAGNETIC PICKUP

	BLADE RECORD	BLADE COLOR	TIP TARGET CONFIGURATION	BLADE S/N	TIP WT VIBREX
INITIAL CONFIGURATION	FWD TARGET				
	FWD A				
	FWD B				
	AFT TARGET				
	AFT A				
	AFT B				

POST FLIGHT CORRECTION

FWD BLADE	P/L	WT	P/L	WT	P/L	WT	P/L	WT	P/L	WT
AFT BLADE										

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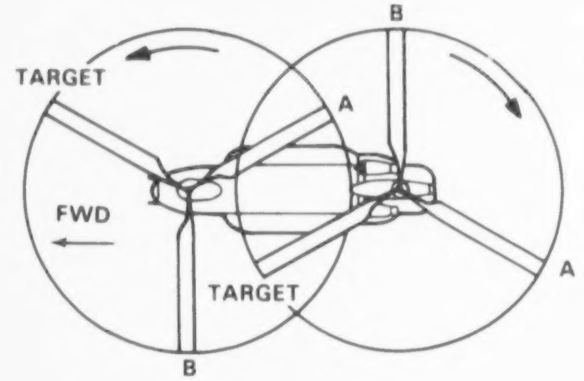
CH-47 FIBERGLASS ROTOR BLADES CONFIGURATION RECORD



AIRCRAFT S/N ____________

AIRCRAFT MODEL ____________

DATE ____________

NOTE: POSITION BLADES SO DOUBLE INTERRUPTER IS OVER MAGNETIC PICKUP

INITIAL CONFIGURATION

BLADE RECORD	BLADE COLOR	TIP TARGET CONFIGURATION	BLADE S/N	TIP WT VIBREX
FWD TARGET				
FWD A				
FWD B				
AFT TARGET				
AFT A				
AFT B				

POST FLIGHT CORRECTION

FWD BLADE										
	P/L	WT	P/L	WT	P/L	WT	P/L	WT	P/L	WT
AFT BLADE										

13281

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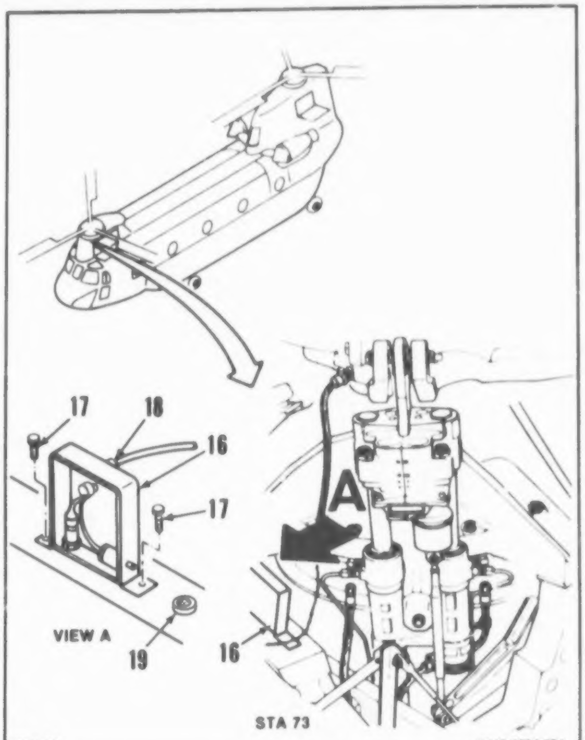
5-139 PREPARE FOR TRACKING AND BALANCING (Continued) 5-139

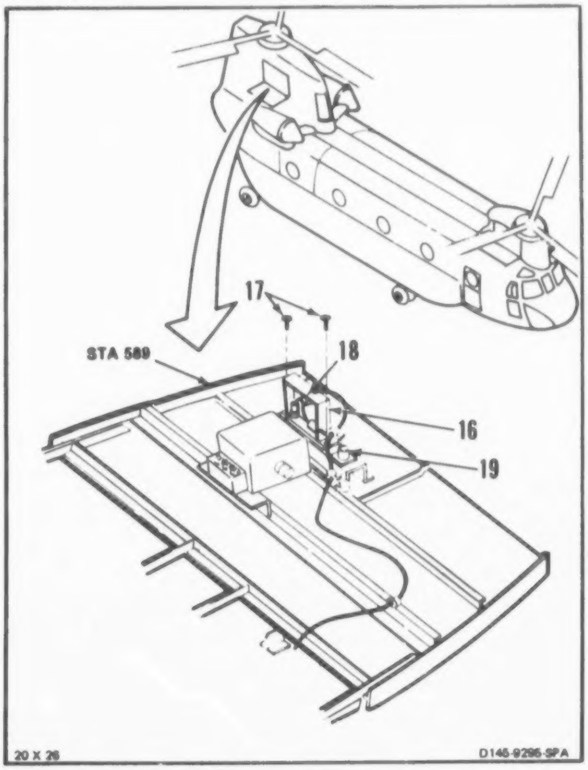
NOTE

Accelerometer blocks and screws are part of vibrex accessory kit.

8. **Install forward accelerometer block (16).** Use two screws (17). Remove plug (18) from dummy receptacle (19). **Connect plug to accelerometer block (16).**


17
18
16
17
A
VIEW A
19
16
STA 73
20 X 26
D145-9294-SPA

9. **Install aft accelerometer block (16).** Use two screws (17). Remove plug (18) from dummy receptacle (19). **Connect plug to accelerometer block (16).**


17
STA 589
18
16
19
20 X 26
D145-9295-SPA

GO TO NEXT PAGE

5-139 PREPARE FOR TRACKING AND BALANCING (Continued) 5-139

10. **Connect rotary switch (20) to balancer (21)** as follows:

    a. Install rotary switch (20) on balancer (21). Use two screw caps (22).

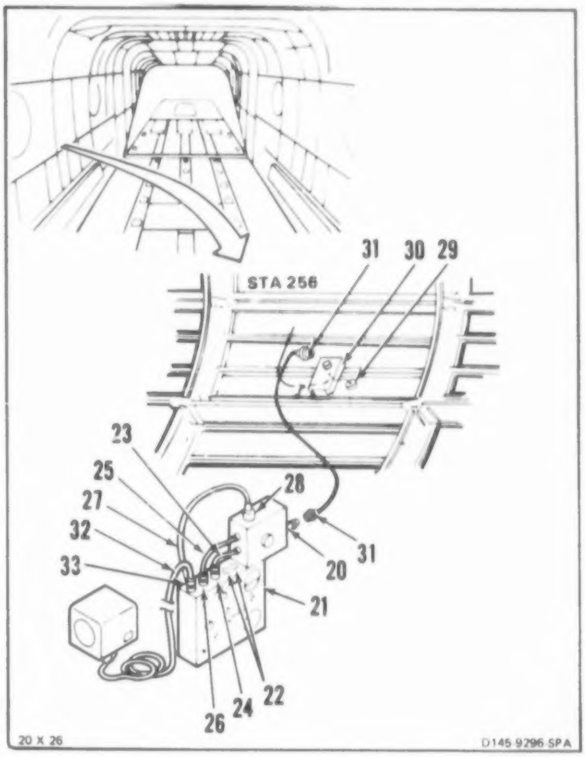
    b. Connect short cable (23) to magnetic pickup CHANNEL A connector (24) on balancer (21).

    c. Connect long cable (25) to ACCELEROMETER A connector (26) on balancer (21).

    d. Connect power cord (27) on balancer (21) to connector (28) on rotary switch (20).

11. Remove dust cap (29) from blade track receptacle (30). **Connect cable connectors (31)** to receptacle and to rotary switch (20) on balancer (21).

12. **Connect Strobex tracker cable (32)** to BLADE TRACK receptacle (33) on balancer (21).

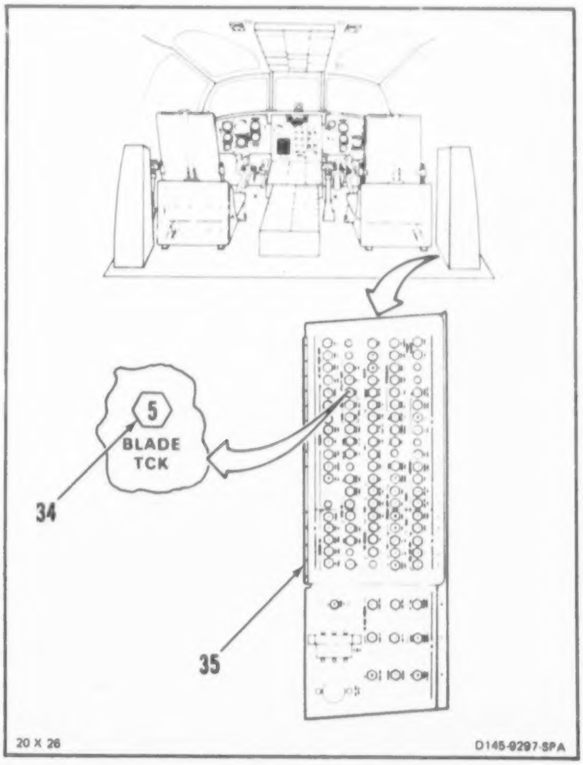

31
30
29
STA 256
23
25
27
32
33
28
20
31
21
26
24
22
20 X 26
D145-9296-SPA

13. Check that BLADE TCK circuit breaker (34) on No. 2 power distribution panel (35) is closed.

FOLLOW-ON MAINTENANCE:

Close work platforms (Task 2-2).

Ground tracking (Task 5-140).


5
BLADE TCK
34
35
20 X 26
D145-9297-SPA

END OF TASK

5-140 GROUND TRACKING

INITIAL SETUP

Applicable Configurations:
All

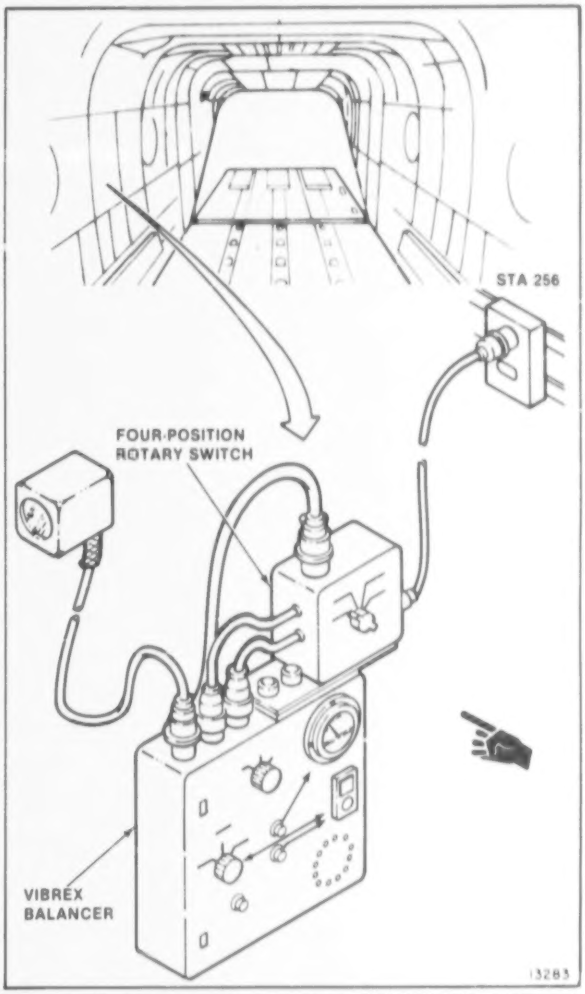
Tools:
None

Materials:
Strobex Tracking Cards

Personnel Required:
Medium Helicopter Repairer
Inspector
Army Rotary-Wing Aviator (2)

References:
TM 55-1520-240-10
Task 5-94

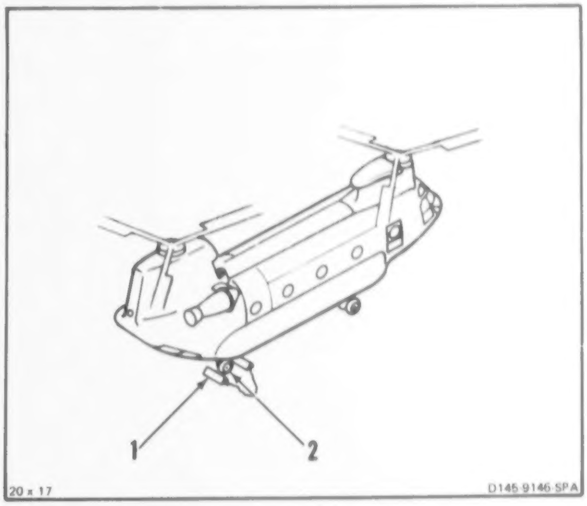
Equipment Condition:
Electrical Power On
Helicopter Prepared for Tracking and Balancing (Task 5-139)



WARNING

When the rotors are turning, use care outside the helicopter. Stay outside of the rotor disk area in front of the helicopter. Do not climb on top of the helicopter until the blades come to a stop. Serious injury or loss of life can occur if personnel are struck by a moving blade.

1. **Have pilot start engines and head helicopter into wind at 100 percent rotor rpm.** Have pilot lock aft wheel swivels and apply parking brake (TM 55-1520-240-10).
2. Place chocks (1) against one aft wheel (2).



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EQUIPMENT OPERATIONAL CHECK

3. **Perform equipment operational check** as follows:

   a. **Set MAGNETIC PICKUP switch (3) to COMMON.**

   b. **Set FUNCTION switch (4) to TRACK.**

   c. **Set RPM TUNE dial (5) to 225.**

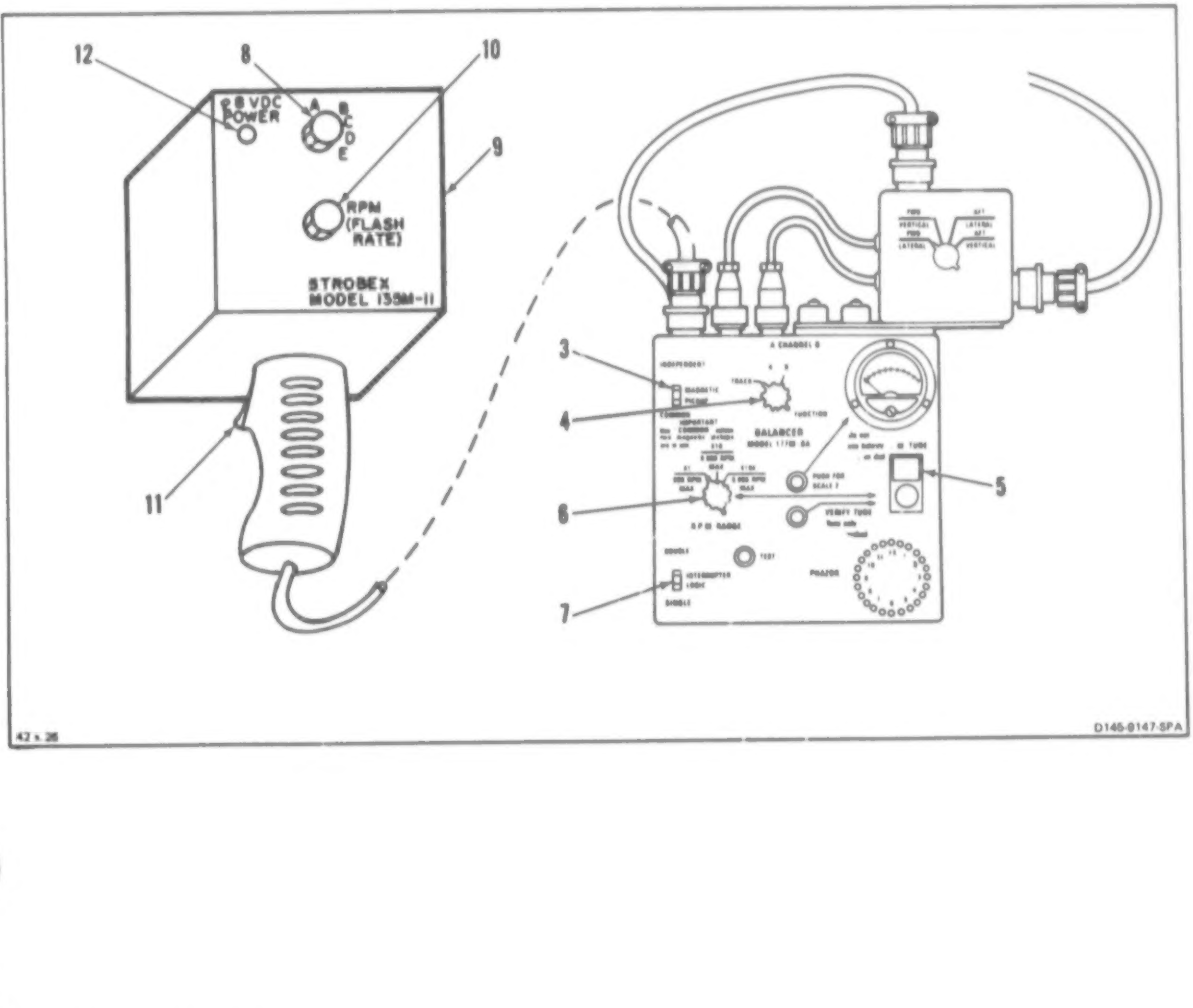
   d. **Set RPM RANGE switch (6) to X1.**

   e. **Set INTERRUPTER LOGIC switch (7) to DOUBLE.**

   f. **Set selector switch (8)** on tracker (9) **to B.**

   g. **Set RPM dial (10) to 268.**

   h. Point tracker (9) down and press trigger (11). Check that tracker flashes at steady 3-per-rev rate. Check that green 28 VDC power light (12) comes on.


12
8
10
9
28 VDC POWER
A
B
C
D
E
RPM (FLASH RATE)
STROBEX MODEL 135M-11
11
3
4
6
7
5
A CHANNEL B
BALANCER
42 x 26
D145-8147-SPA

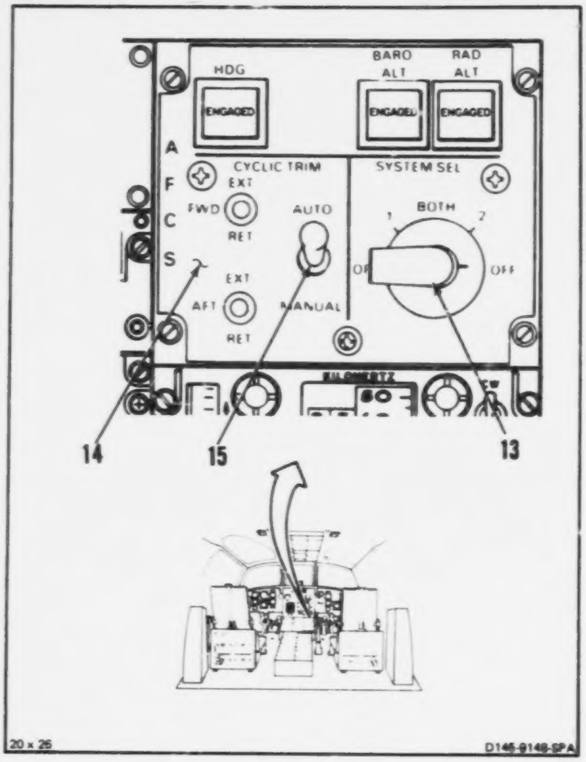
5-140 GROUND TRACKING (Continued) 5-140

FORWARD BLADE TRACKING

CAUTION

Make sure cyclic trim actuators are not extended during tracking. Damage to droop stops and excess stress on the aft blades and rotor shaft will result.

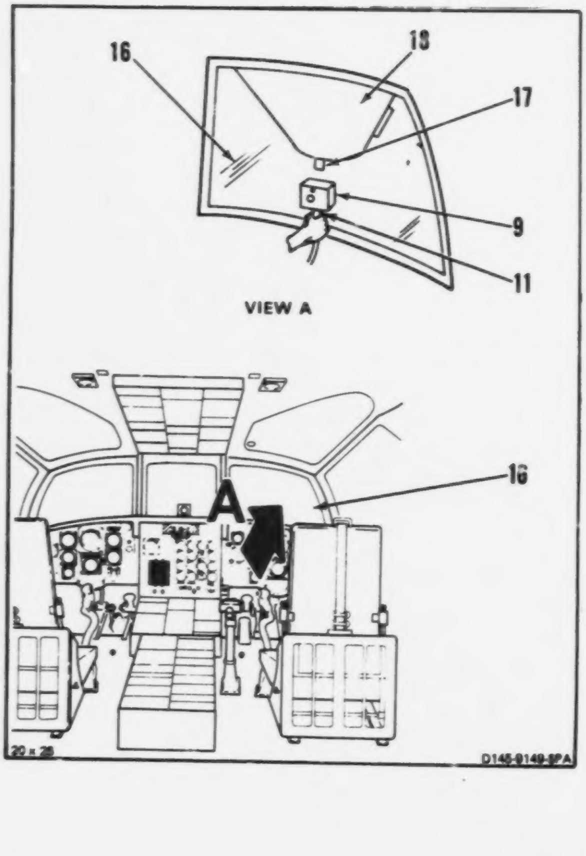
4. **Set SYSTEM SEL switch (13) on AFCS panel (14) to OFF. Check that CYCLIC TRIM switch (15) on AFCS panel is set to AUTO.**


HDG
BARO ALT
RAD ALT
ENGAGED
ENGAGED
ENGAGED
A
F
C
S
CYCLIC TRIM
EXT
FWD
RET
AUTO
EXT
AFT
RET
MANUAL
SYSTEM SEL
BOTH
1
2
OFF
OFF
KILOHERTZ
60
14
15
13
20 x 26
D145-9148-SPA

5. **Point tracker (9) through pilot's windshield (16)** at 1 o'clock.
6. Sight across top of tracker (9). Press trigger (11). **Direct light flashes toward targets (17) on forward blades (18).** Direct tracker from side-to-side in W pattern until tip targets are detected.

NOTE

Horizontal spread of tape strips as seen with tracker has no effect on track. Always use center blade as main focal point. Focus on pattern formed by center target and one other target at a time. Looking at pattern of all three targets at once is difficult.


16
18
17
9
11
VIEW A
A
16
20 x 26
D145-9149-SPA

GO TO NEXT PAGE

NOTE

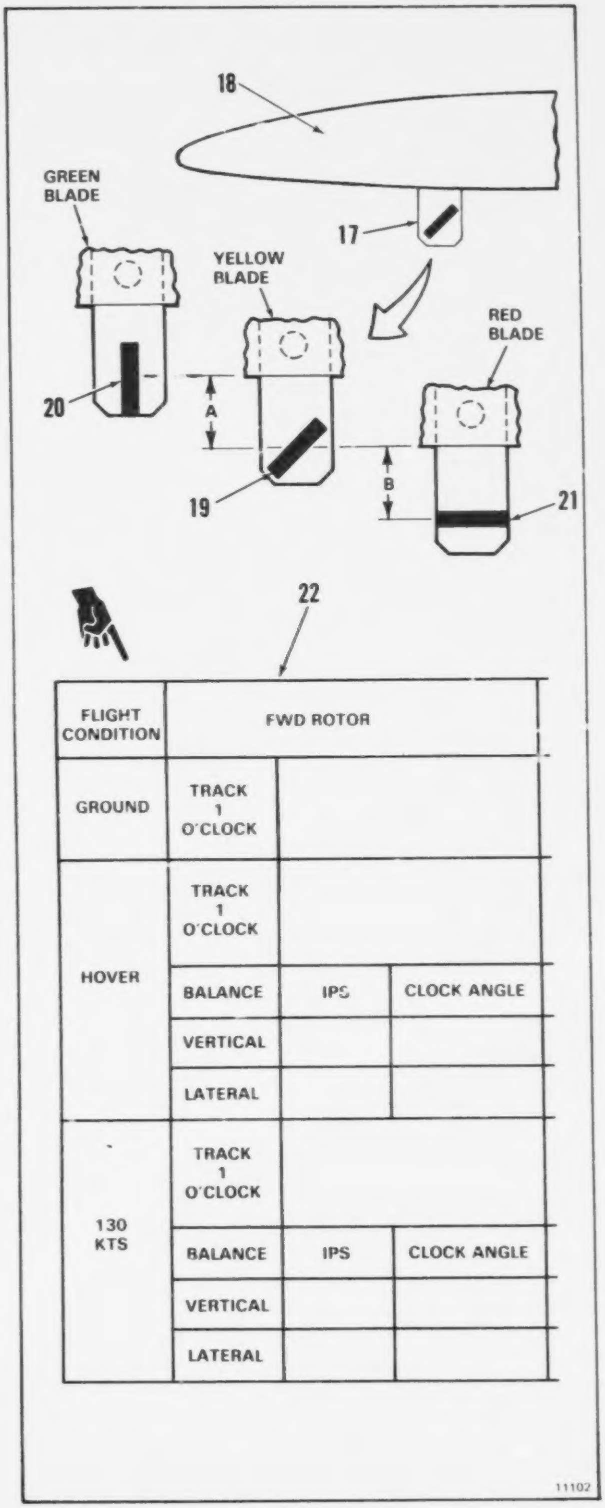
- Green blade (vertical tape) is on pitch housing with green band. Red blade (horizontal tape) is on pitch housing with red band. Yellow blade (diagonal tape) is on pitch housing with yellow band.
- If one or two blades have been replaced on the same rotor head, track to a blade that was not changed.

7. **View pattern of tapes (19, 20, and 21)** on targets (17). **Note which tape is in center.** Track to center blade (18), unless center blade is a replacement blade. Yellow blade is shown in center here.
8. Observe the relative vertical positions of the top and center blades. Estimate the distance between center of tape markers (19) and (20).

NOTE

Tracking tape is 0.20 inch wide and 1.0 inch long. Five tape widths equal 1.0 inch.

9. Mark the top and center blade tape patterns on the Track and Balance Worksheet (22) in their relative positions. Record the estimated distance between tape centers.
10. Observe the relative vertical positions of the center and bottom blades. Estimate the distance between centers of tape markers (19) and (21).
11. Mark the bottom blade tape pattern on worksheet (22) in its position relative to the center blade. Record the estimated distance between tape centers.
12. Add the total distance between markers (20) and (21).



FLIGHT CONDITION	FWD ROTOR		
GROUND	TRACK 1 O'CLOCK		
HOVER	TRACK 1 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE
	VERTICAL		
	LATERAL		
130 KTS	TRACK 1 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE
	VERTICAL		
	LATERAL		

GO TO NEXT PAGE

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TRACK AND BALANCE WORK SHEET

FLIGHT NO: ____________________ AIRCRAFT S/N: ____________________

DATE: ________________________ AIRCRAFT MODEL: ________________

FLIGHT CONDITION	FWD ROTOR			AFT ROTOR		
GROUND	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
HOVER	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE	BALANCE	IPS	CLOCK ANGLE
	VERTICAL			VERTICAL		
	LATERAL			LATERAL		
130 KTS	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE	BALANCE	IPS	CLOCK ANGLE
	VERTICAL			VERTICAL		
	LATERAL			LATERAL		

13282

GO TO NEXT PAGE

AFT BLADE TRACKING

13. **Point tracker (9) through aft right window (27)** at 3 o'clock.
14. Sight across tracker (9). Press trigger (11). **Direct light flashes toward targets (17) on aft blades (28).** Sweep lamp from side-to-side in W pattern until targets are detected.
15. View pattern of tapes (19, 20, and 21) on targets (17). Track to center blade unless it is a replacement blade. Red blade shown in center here.
16. Observe the relative vertical positions of the top and center blades. Estimate the distance betwen centers of tape markers (19) and (21).

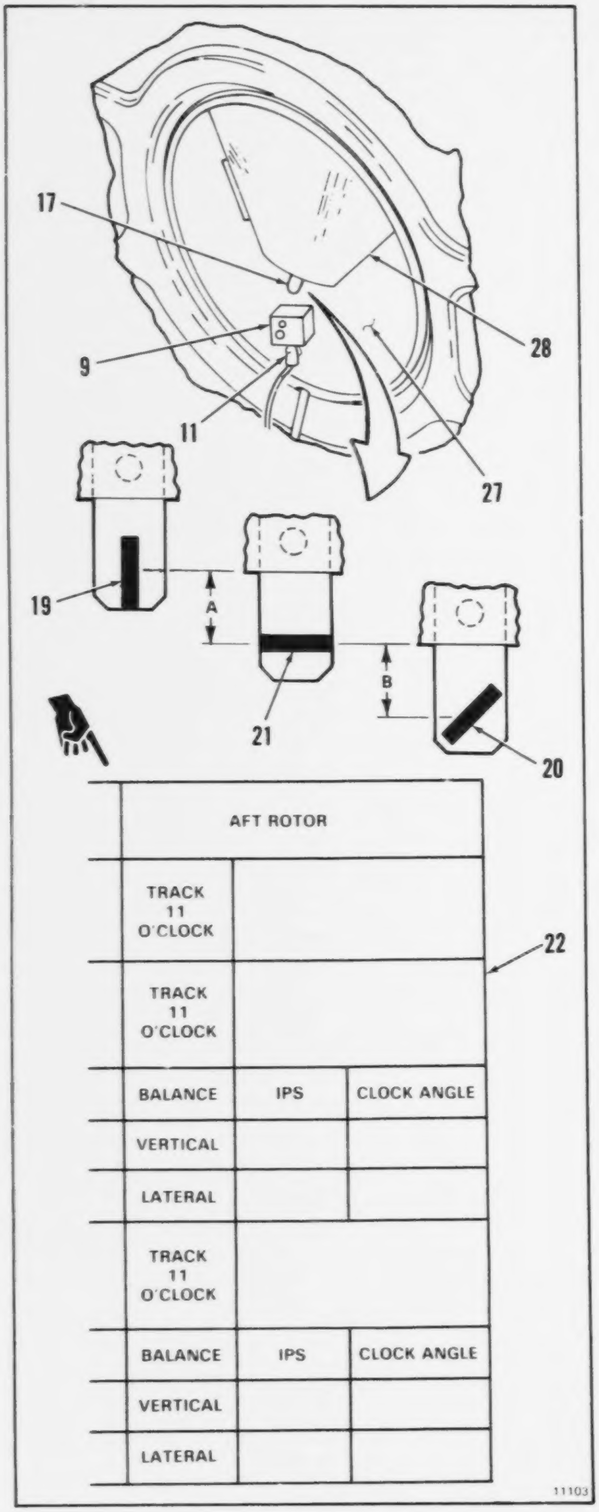
NOTE

Tracking tape is 0.20 inch wide and 1.0 inch long. Five tape widths equal 1.0 inch.

17. Mark the top and center blade tape patterns on the Track and Balance Worksheet (22) in their relative positions. Record the estimated distance betwen tape centers.
18. Observe the relative vertical positions of the center and bottom blades. Estimate the distance between centers of tape markers (21) and (20).
19. Mark the botom blade tape pattern on worksheet (22) in its position relative to the center blade. Record the estimated distance between tape centers.

19.1. Add the total distance between markers (19) and (20).

20. Have pilot stop engines (TM 55-1520-240-10).
21. If total out-of-track distance in steps 12. and 19.1. was less than two tape widths (0.4 inch), go to FOLLOW-ON MAINTENANCE.



	AFT ROTOR		
	TRACK 11 O'CLOCK		
	TRACK 11 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE
	VERTICAL		
	LATERAL		
	TRACK 11 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE
	VERTICAL		
	LATERAL		

GO TO NEXT PAGE

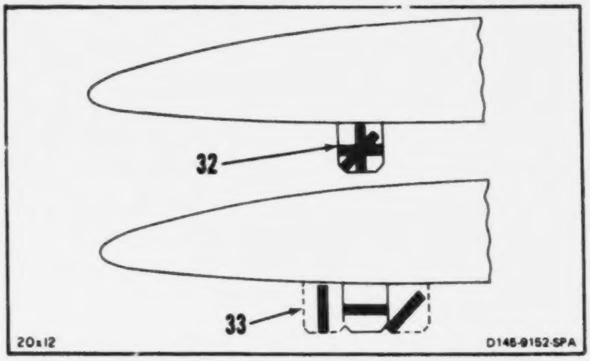
5-140 GROUND TRACKING (Continued) 5-140

22. **Use following guidelines to correct track:**

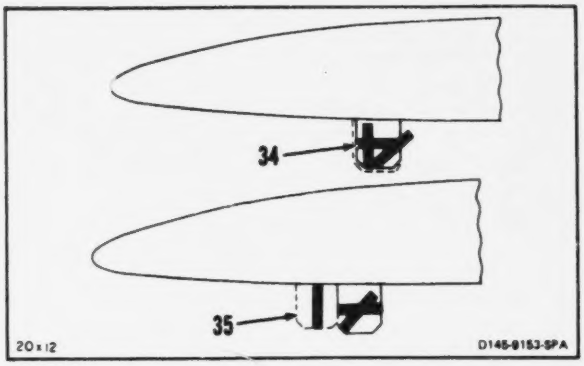
NOTE

Horizontal spread of targets is normal and requires no correction.

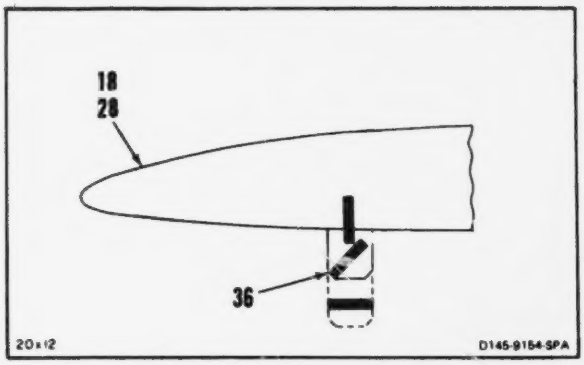
   a. Targets must overlap vertically. Maximum center-to-center spread is two tape widths between top and bottom blades.
   b. Target patterns (32 and 33) are ideal and require no correction.


32
33
20x12
D145-9152-SPA

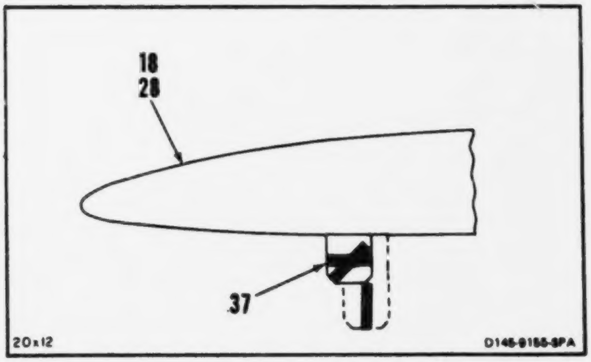
   c. Track patterns (34 and 35) require no correction.


34
35
20x12
D145-9153-SPA

   d. Track pattern (36) shows green and red blades (18 or 28) out of track. Green blade must be lowered. Red blade must be raised.


18
28
36
20x12
D145-9154-SPA

   e. Track pattern (37) shows green blade (18 or 28) out of track. Green blade must be raised.


18
28
37
20x12
D145-9155-SPA

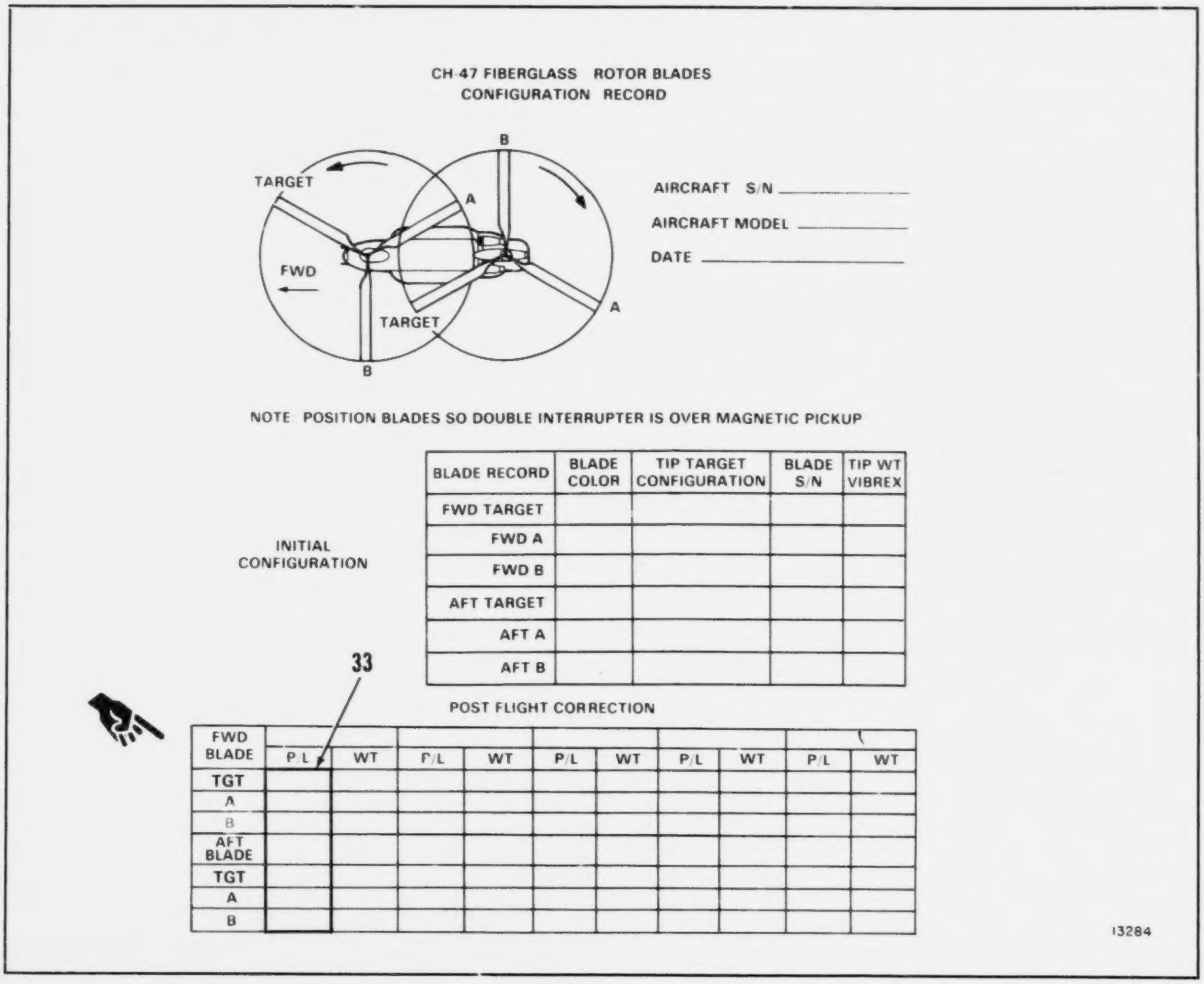
GO TO NEXT PAGE

NOTE

One mark of pitch link adjustment will change ground blade track 0.125 inch.

23. **Figure number of marks and direction of pitch link adjustment** as follows:
    a. Multiply distance A by 5 for forward head. Answer is number of marks of pitch link adjustment to bring high blade down into track. Mark number in correction box (33) for high blade.
    b. Multiply distance B by 5 for forward head. Answer is number of marks of pitch-link adjustment to bring low blade up into track. Mark number in correction box (33) for low blade.
    c. Repeat steps a. and b. for aft head.
24. Adjust pitch links (Task 5-94).
25. Repeat ground track in steps 1. through 20.

INSPECT



CH-47 FIBERGLASS ROTOR BLADES
CONFIGURATION RECORD

AIRCRAFT S/N ____________

AIRCRAFT MODEL ____________

DATE ____________

NOTE POSITION BLADES SO DOUBLE INTERRUPTER IS OVER MAGNETIC PICKUP

INITIAL CONFIGURATION

BLADE RECORD	BLADE COLOR	TIP TARGET CONFIGURATION	BLADE S/N	TIP WT VIBREX
FWD TARGET				
FWD A				
FWD B				
AFT TARGET				
AFT A				
AFT B				

POST FLIGHT CORRECTION

FWD BLADE	P/L	WT	P/L	WT	P/L	WT	P/L	WT	P/L	WT
TGT										
A										
B										
AFT BLADE										
TGT										
A										
B										

13284

FOLLOW-ON MAINTENANCE:

In-flight tracking (Task 5-141).

END OF TASK

5-141 IN-FLIGHT TRACKING 5-141

INITIAL SETUP

Applicable Configurations:
All

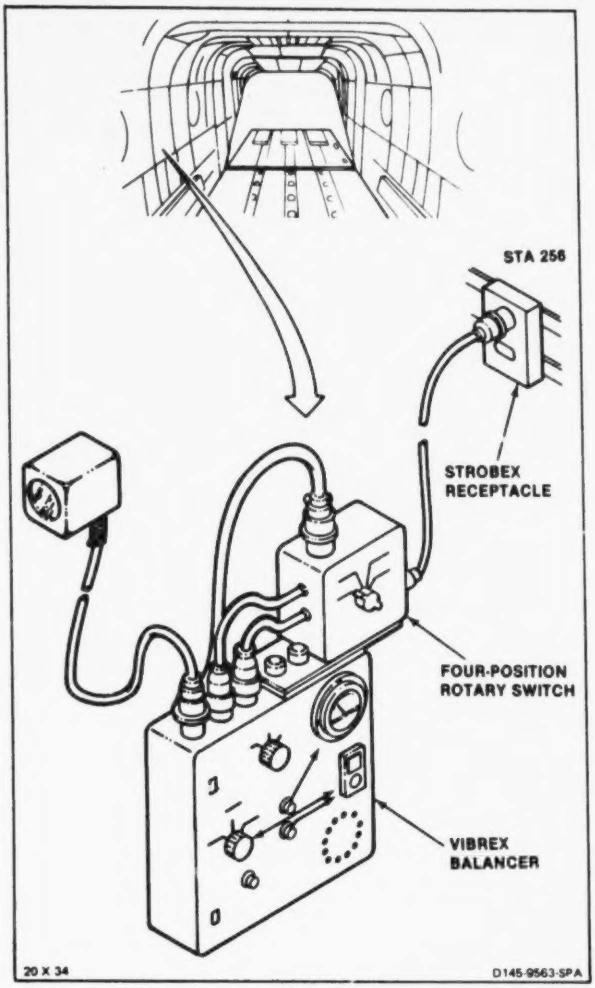
Tools:
None

Materials:
Strobex Tracking Cards

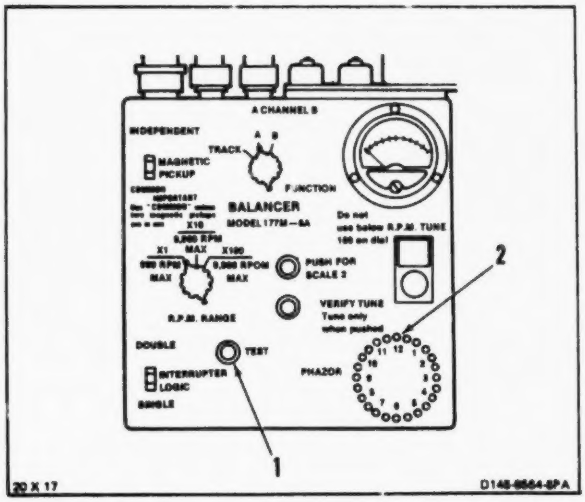
Personnel Required:
67U20 Medium Helicopter Repairer
100C0 Army Rotary-Wing Aviator (2)

References:
TM 55-1520-240-10
Task 1-26
Task 5-94

Equipment Condition:
Helicopter Prepared for Tracking and Balancing (Task 5-139)
Helicopter Ground Tracked (Task 5-140)


STA 256
STROBEX RECEPTACLE
FOUR-POSITION ROTARY SWITCH
VIBREX BALANCER
20 X 34
D145-9563-SPA

1. **Have pilot start engines** (TM 55-1520-240-10).
2. Press test switch (1). **Check** that **phazor lights (2)** come on at 12, 4, and 8 o'clock positions.


A CHANNEL B
INDEPENDENT
TRACK
A
B
MAGNETIC PICKUP
FUNCTION
BALANCER
MODEL 177M—6A
Do not use below R.P.M. TUNE 100 on dial
X10
X1
MAX
X100
MAX
MAX
PUSH FOR SCALE 2
R.P.M. RANGE
VERIFY TUNE
Tune only when pushed
DOUBLE
TEST
INTERRUPTER LOGIC
SINGLE
PHAZOR
11 12 1 2 3 4 5 6 7 8 9 10
1
2
20 X 17
D145-9564-SPA

GO TO NEXT PAGE

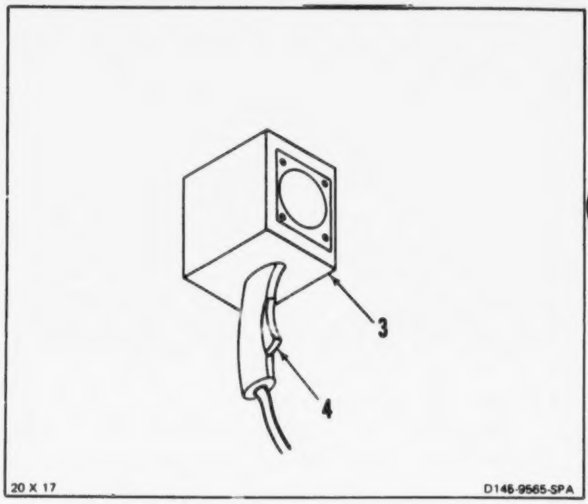
5-141 IN-FLIGHT TRACKING (Continued) 5-141

3. Point tracker (3) down. Press trigger (4). Lamp shall flash at steady 3-per-rev rate. Release trigger.

NOTE

On bright or sunny days, pilot should head helicopter away from sun. If helicopter must be headed toward sun, wear polarized sunglasses for tracking.

4. **Have pilot fly helicopter straight and level at 130 kias and 225 rpm** (TM 55-1520-240-10).

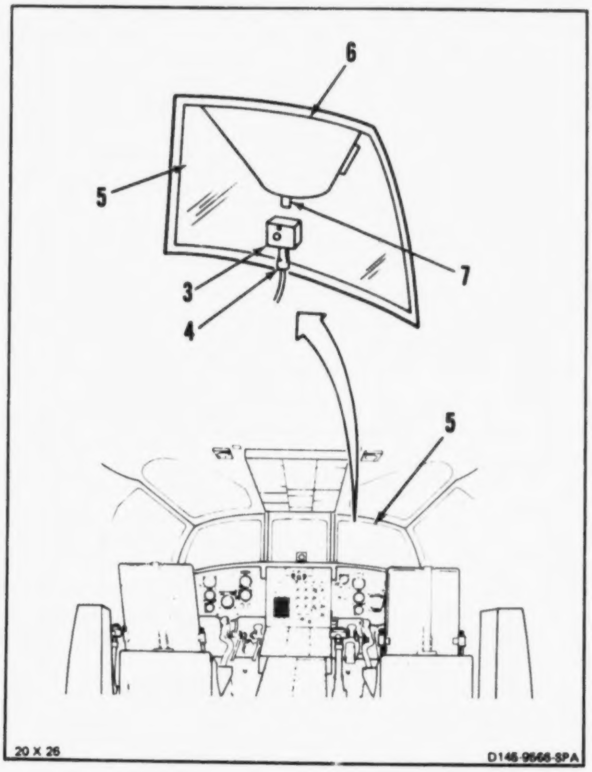


FORWARD BLADE TRACKING

5. **Point tracker (3)** through pilot's windshield (5) at 1 o'clock position.
6. Sight across top of tracker (3). **Press trigger (4)** and direct light flashes toward targets (7) on blades (6). **Direct tracker** from side-to-side in W pattern **until tip targets are detected.**

NOTE

Horizontal spread of tape strips as seen with tracker has no effect on track. Always use center blade as main focal point. Focus on pattern formed by center target and one other target at a time. Looking at pattern of all three targets at once is difficult. Once center blade has been identified, do not switch to another blade. Switching center blades can affect longitudinal stick position and autorotational rpm. This is caused by pitch link adjustments which result in thrust unbalance between forward and aft blades. In hover, unbalance can require holding control stick too far forward or aft to maintain correct attitude. To correct condition, all pitch links must be readjusted.



GO TO NEXT PAGE

NOTE

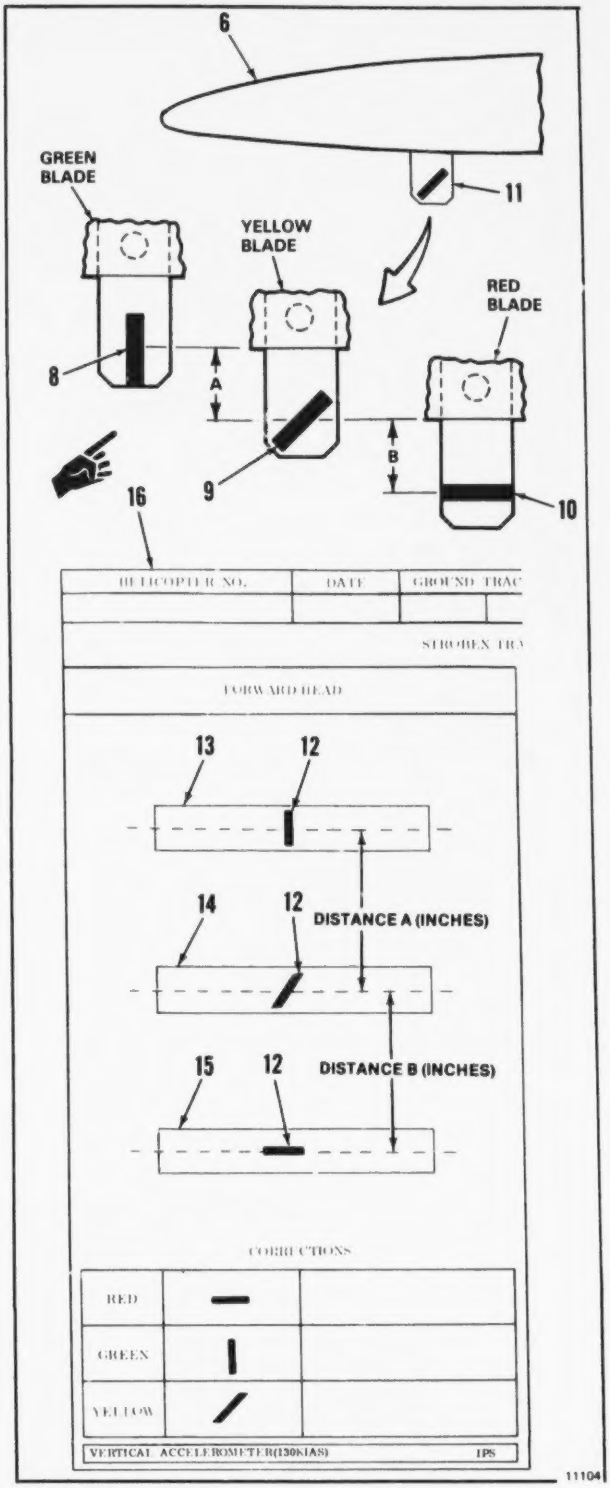
If one or two blades have been replaced on the same rotor head, track to a blade that was not changed.

7. **View pattern of tapes (8, 9, and 10)** on targets (11). **Note which tape is in center. Track to center blade (6), unless center blade is a replacement blade.** Yellow blade is shown in center here.
8. **Mark tape symbols (▮, ⧸, or ▬)** (12) in blocks (13, 14, and 15) as follows:
   a. Mark diagonal line (12) in center block (14) to show yellow blade in center on example pattern. Use forward side of tracking card (16).
   b. Mark vertical line (12) in high block (13) to show green blade high on example pattern.
   c. Mark horizontal line (12) in low block (15) to show red blade low on example pattern.

NOTE

Tracking tape is 0.20 inch wide and 1 inch long. Five tape widths equal 1 inch

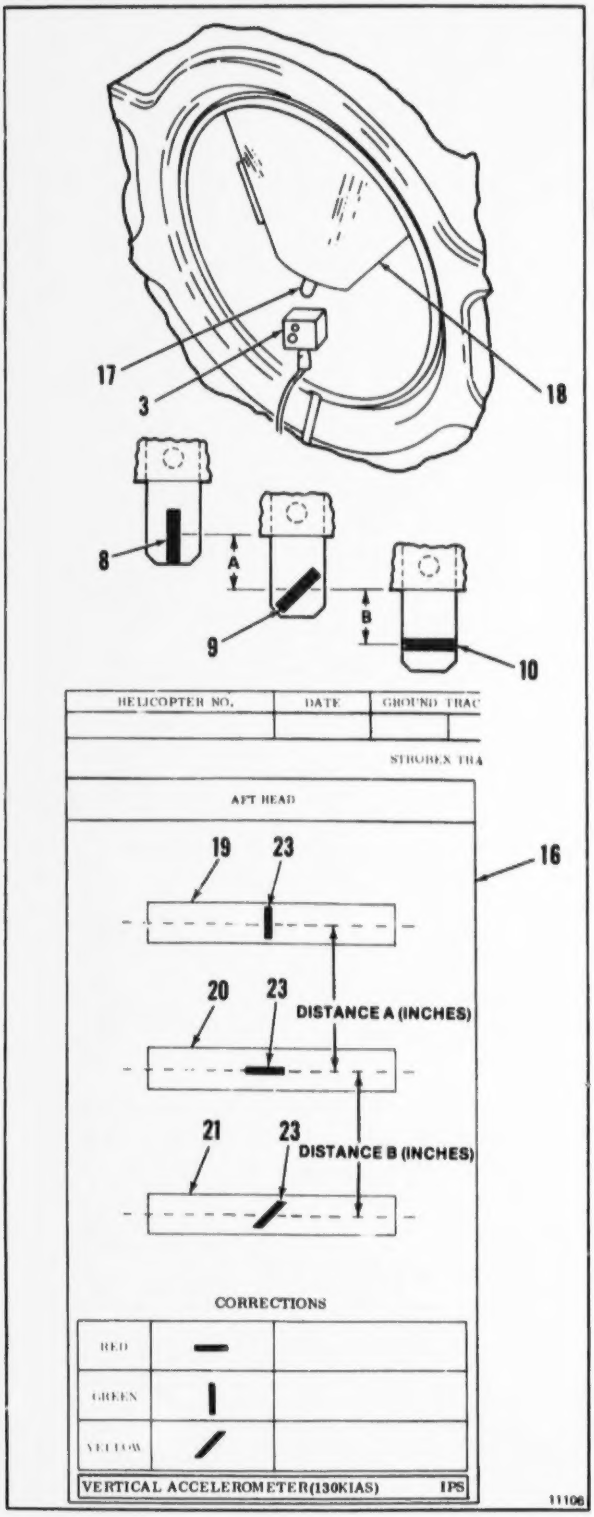
9. **Estimate distance A in inches from center of tape (9) to center of high tape (8).** Green blade is shown high here.
10. **Mark distance** between blocks (13 and 14).
11. **Repeat step 6. Estimate distance B in inches from center of center tape (9) to center of low tape (10).** Red blade is shown low here.
12. **Mark distance** between blocks (14 and 15) on tracking card (16).


6
GREEN BLADE
11
YELLOW BLADE
RED BLADE
8
A
B
9
10
16
HELICOPTER NO.
DATE
GROUND TRAC
STROBEX TR
FORWARD HEAD
13
12
14
12
DISTANCE A (INCHES)
15
12
DISTANCE B (INCHES)
CORRECTIONS
RED
GREEN
YELLOW
VERTICAL ACCELEROMETER(130KIAS)
IPS
11104

GO TO NEXT PAGE

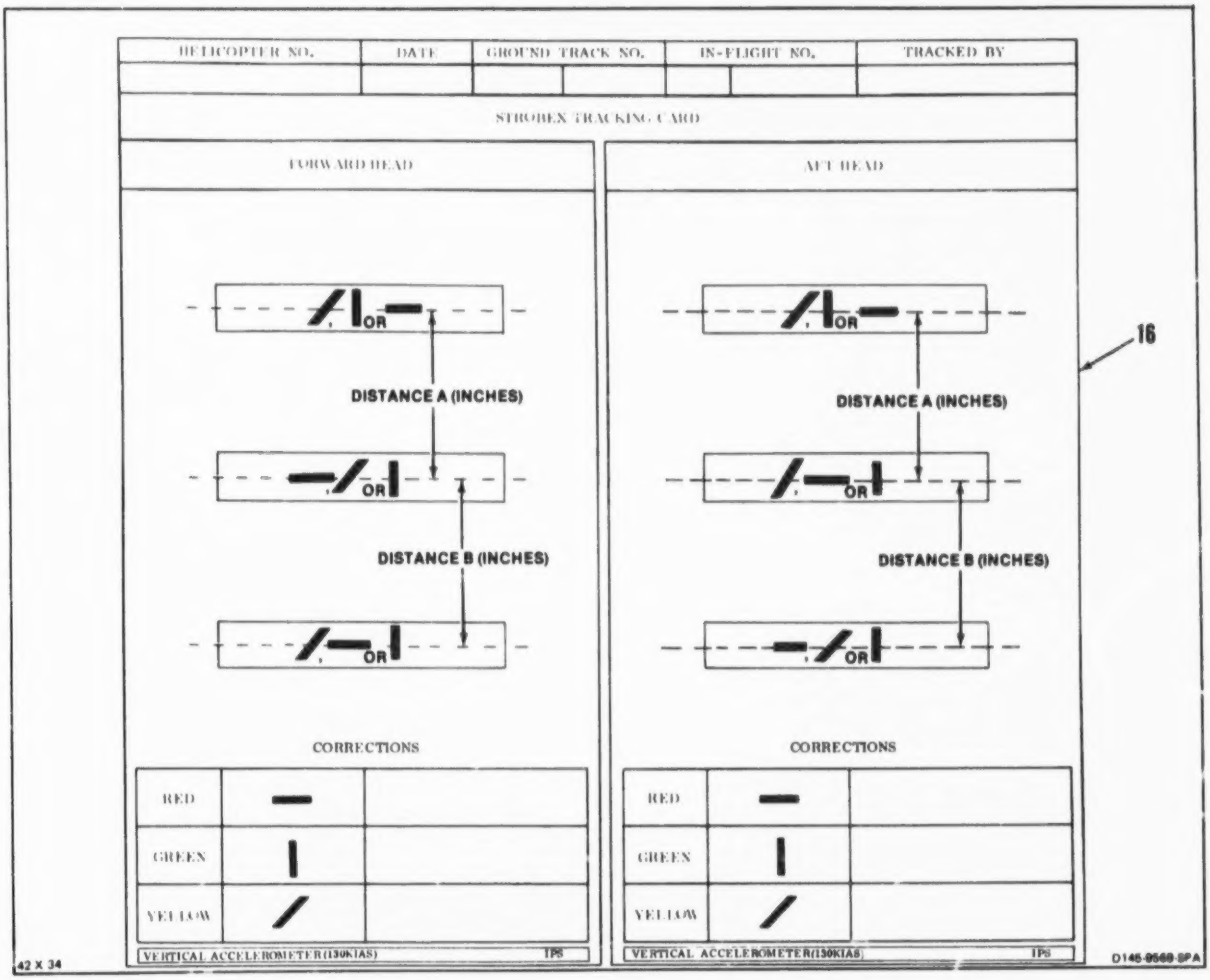
5-141 IN-FLIGHT TRACKING (Continued) 5-141

13. **Point tracker (3)** through aft left window (17) at 11 o'clock.
14. Sight across tracker (3). Press trigger (4). Direct light flashes toward targets (11) on aft blade (18). Direct lamp from side-to-side in W pattern until targets are detected.
15. **Mark tape symbols (▮, ⁄, or ▬)** (23) in blocks (19, 20, and 21) as follows:
    a. Mark horizontal line (23) in center block (20) to show red blade in center on example pattern. Use aft side of card (16).
    b. Mark vertical line (23) in high block (19) to show green blade high on example pattern.
    c. Mark diagonal line (23) in low block (21) to show yellow blade low on example pattern.
16. **Estimate distance A in inches from center of tape (19) to center of high tape (8). Mark distance A** on card (16). Green blade is shown high here.
17. **Mark distance between blocks (19 and 20) on tracking card (16).**
18. **Repeat step 14. Estimate distance B in inches from center of center tape (9) to center of low tape (10).** Yellow blade is shown low here.
19. **Mark distance** between blocks (20 and 21) on tracking card (16).
20. Have pilot land helicopter (TM 55-1520-240-10).


17
3
18
8
A
9
B
10
HELICOPTER NO.
DATE
GROUND TRAC
STROBEX TRA
AFT HEAD
16
19
23
20
23
DISTANCE A (INCHES)
21
23
DISTANCE B (INCHES)
CORRECTIONS
RED
GREEN
YELLOW
VERTICAL ACCELEROMETER(130KIAS)
IPS
11106

GO TO NEXT PAGE

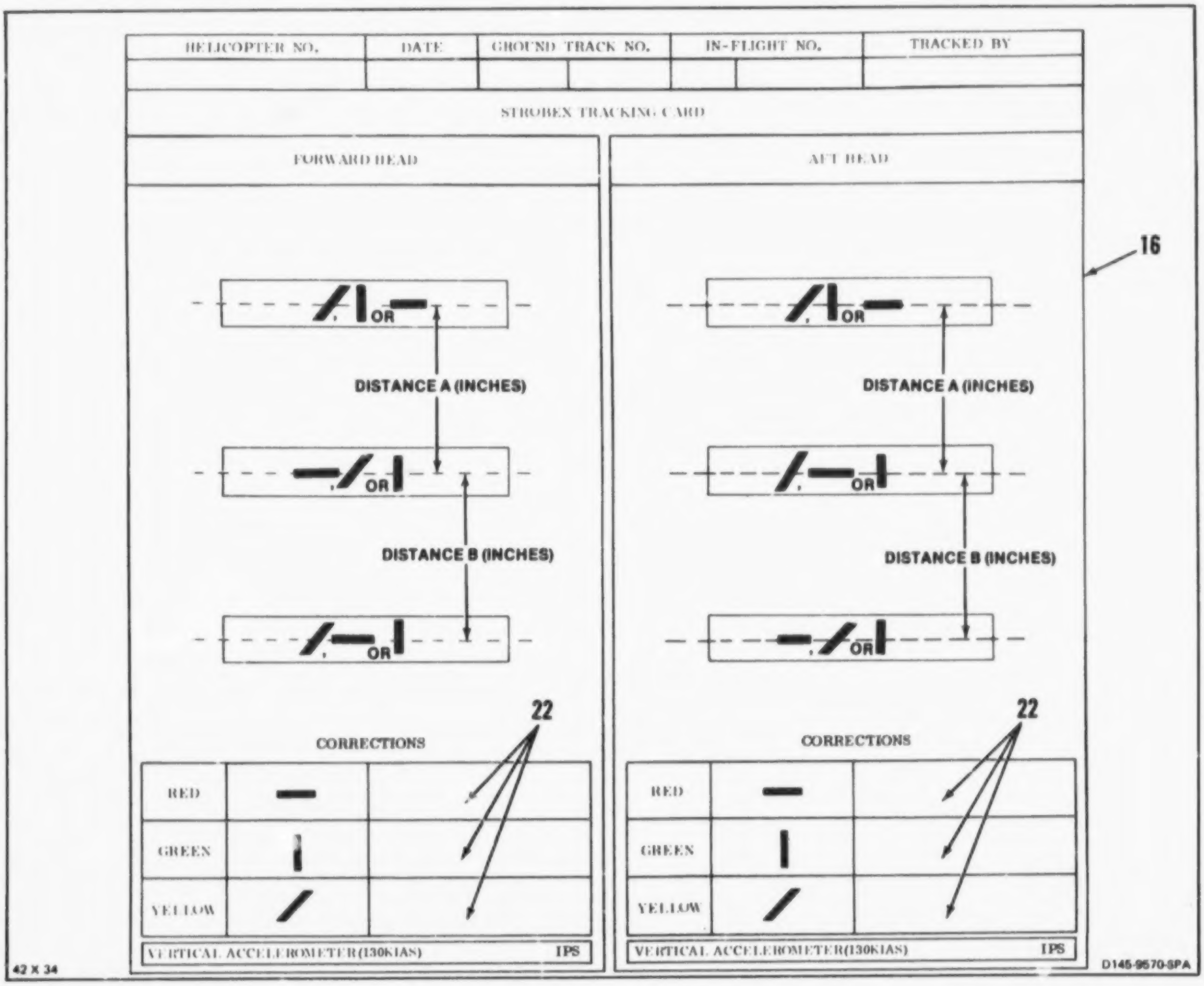
21. Add distances A and B on card (16) for both heads.
    a. If distances A and B on both heads are less than 0.5 inch (2-1/2 tape widths), go to FOLLOW-ON MAINTENANCE.
    b. If distances A and B for either or both heads are more than 0.5 inch (2-1/2 tape widths), go to step 22.


HELICOPTER NO.
DATE
GROUND TRACK NO.
IN-FLIGHT NO.
TRACKED BY
STROBEX TRACKING CARD
FORWARD HEAD
AFT HEAD
OR
DISTANCE A (INCHES)
DISTANCE B (INCHES)
16
CORRECTIONS
RED
GREEN
YELLOW
VERTICAL ACCELEROMETER (130KIAS)
IPS
42 X 34
D145-9568-SPA

NOTE

One mark of pitch link adjustment will change in-flight blade track 0.25 inch at 130 kias.

22. **Figure number of marks and direction of pitch link adjustment.** Begin with forward head and forward head side of card.
    a. Multiply distance A by 4. Result is number of marks of pitch link adjustment to lower high blade into track. Mark number in correction box (22) for high blade on card (16).
    b. Multiply distance B by 4. Result is number of marks of pitch link adjustment to raise low blade into track. Mark number in correction box (22) for low blade on card (16).
    c. Repeat steps a. and b. for aft head. Mark corrections on aft side of card (16).
23. Adjust pitch links (Task 5-94).
24. Repeat steps 1 through 21.


HELICOPTER NO.
DATE
GROUND TRACK NO.
IN-FLIGHT NO.
TRACKED BY
STROBEX TRACKING CARD
FORWARD HEAD
AFT HEAD
OR
DISTANCE A (INCHES)
DISTANCE B (INCHES)
CORRECTIONS
RED
GREEN
YELLOW
VERTICAL ACCELEROMETER(130KIAS)
IPS
16
22
42 X 34
D145-9570-3PA

FOLLOW-ON MAINTENANCE:

In-flight balancing (Task 5-142).

END OF TASK

5-142 IN-FLIGHT BALANCING 5-142

INITIAL SETUP

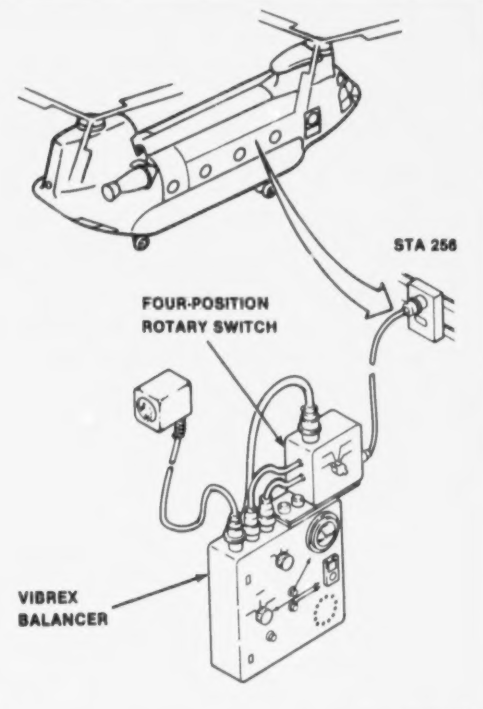
Applicable Configurations:
All

Tools:
None

Materials:
None

Personnel Required:
67U10 Medium Helicopter Repairer
67U20 Medium Helicopter Repairer
100C0 Army Rotary-Wing Aviator (2)

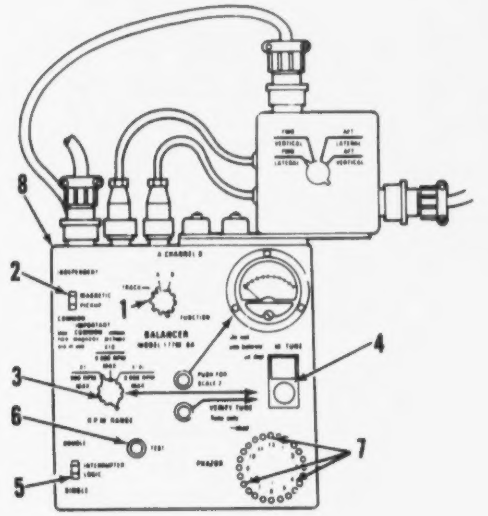
Equipment Condition:
Helicopter in Straight and Level Forward Flight at 130 KIAS, IAS and 100% RPM (TM 55-1520-240-10)
Rotary-Wing Blades Tracked In Flight (Task 5-141)


STA 256
FOUR-POSITION ROTARY SWITCH
VIBREX BALANCER

20X26 D145-10791-SPA

EQUIPMENT OPERATIONAL CHECK

1. **Set balancer FUNCTION switch (1) to A.**
2. **Set balancer MAGNETIC PICKUP switch (2) to COMMON.**
3. **Set RPM RANGE switch (3) to X1.**
4. **Set RPM TUNE dial (4) to 225.**
5. **Set balancer INTERRUPTER LOGIC switch (5) to DOUBLE.**
6. **Press balancer TEST switch (6). Check that PHAZOR lights (7) come on at 12, 4, and 8 o'clock positions.** Lights must come on to verify that balancer (8) works.

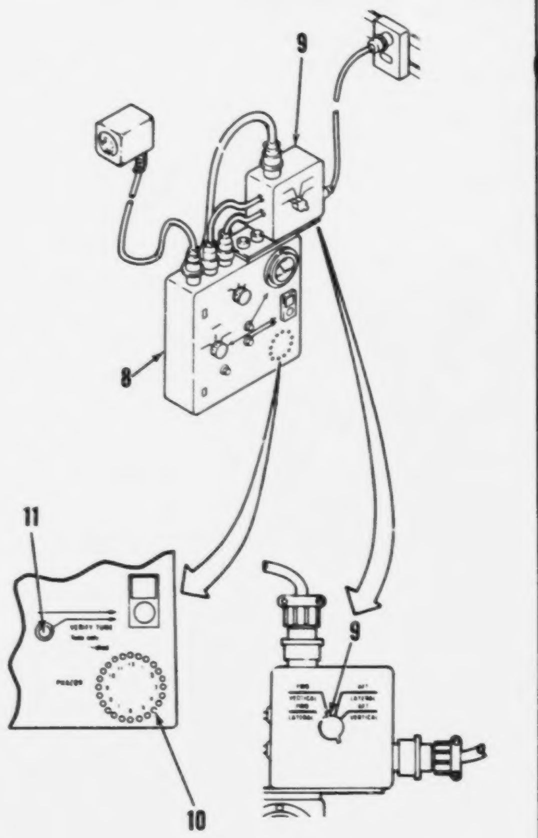

FWD VERTICAL
AFT LATERAL
FWD LATERAL
AFT VERTICAL
8
A CHANNEL B
2
MAGNETIC PICKUP
TRACK
A
B
1
FUNCTION
COMMON
BALANCER
4
3
PUSH FOR SCALE 2
VERIFY TUNE
R P M RANGE
6
TEST
DOUBLE
PHAZOR
7
INTERRUPTER LOGIC
5
SINGLE

20X26 D145-10792-SPA

GO TO NEXT PAGE

BALANCE ROTORS

7. **Set switch (9) to FWD VERTICAL.**
8. **Tune balancer (8) as follows:**
   a. Note clock angle of PHAZOR light (10) that is on.
   b. Press VERIFY TUNE switch (11). Note clock position of PHAZOR light (10) that comes on. If same light is on as in step a, go to step 9. If same light is not on, go to step c.


9
8
11
VERIFY TUNE
PHAZOR
9
FWD VERTICAL
FWD LATERAL
AFT LATERAL
AFT VERTICAL
10

20X34

D145-10793-SPA

GO TO NEXT PAGE

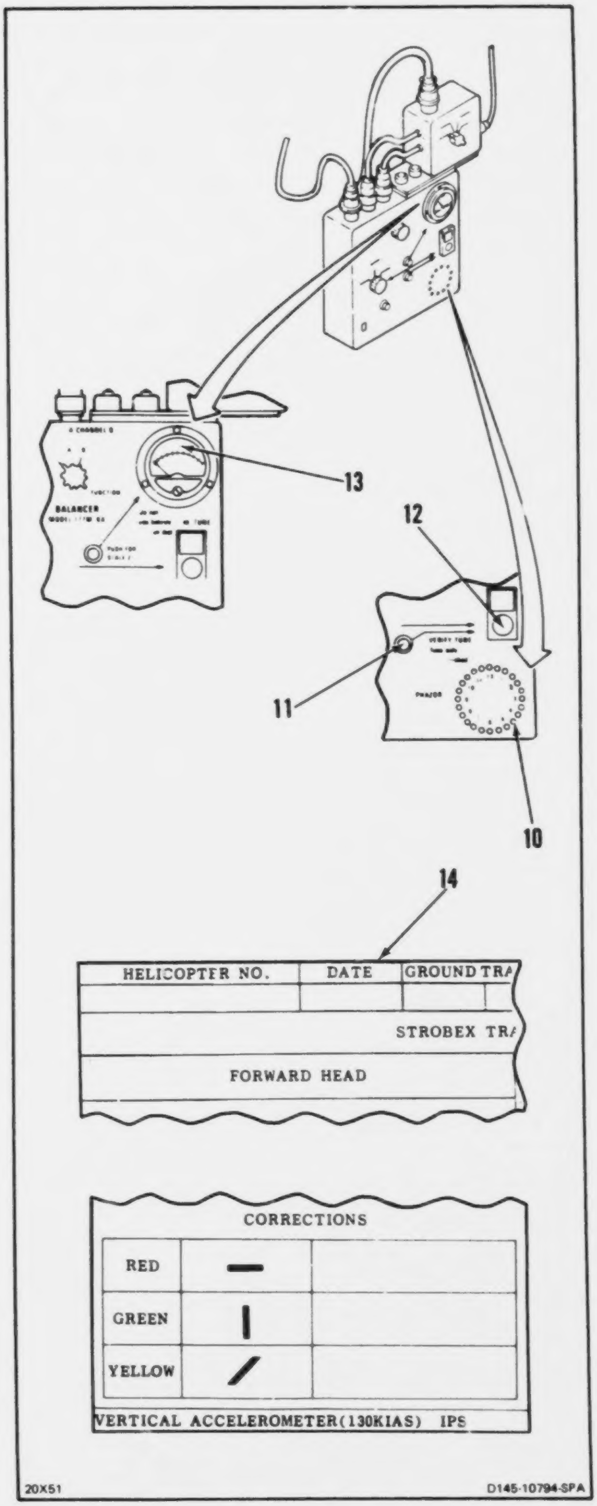
5-142 IN-FLIGHT BALANCING (Continued) 5-142

c. Press and hold VERIFY TUNE switch (11) and adjust RPM TUNE dial (12). If PHAZOR light (10) moves clockwise when VERIFY TUNE switch (11) is pressed, adjust RPM TUNE dial (12) counterclockwise. If PHAZOR light moves counterclockwise when VERIFY TUNE switch is pressed, adjust RPM TUNE dial clockwise.

d. Repeat steps a thru c until PHAZOR light (10) comes on at same clock angle before and after VERIFY TUNE switch (11) is pressed.

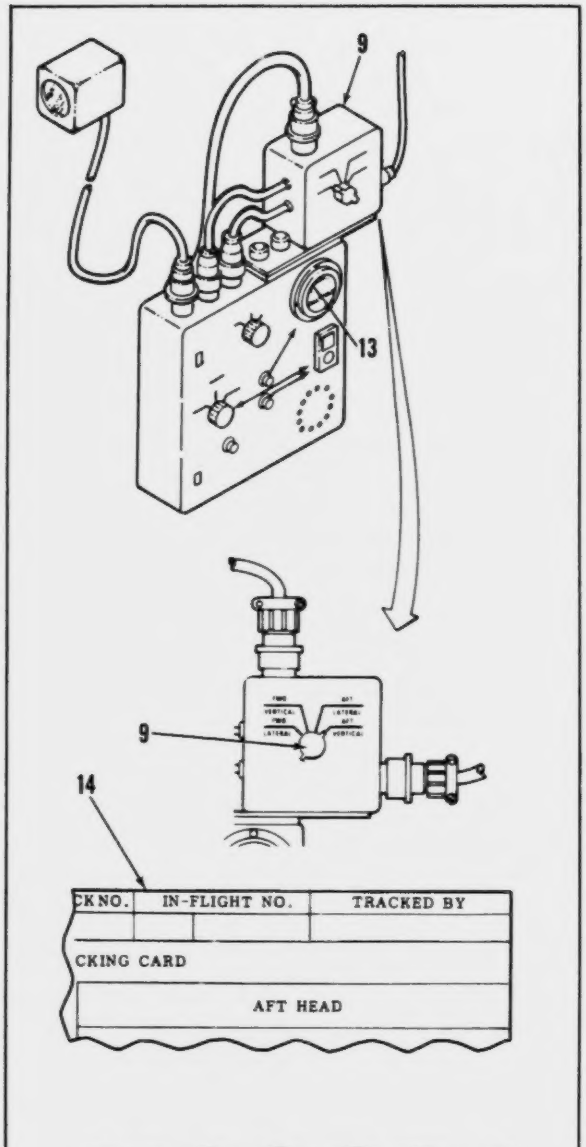
9. **Read vertical vibration on IPS meter (13).** Record reading in forward head section of Tracking Card (14). If reading is less than 1.0 ips, go to step 11. If reading is more than 1.0 ips, go to step 10.

10. If vertical vibration exceeds 1.0 ips, recheck forward blade track (Task 5-141). If track is satisfactory, have pilot land helicopter (TM 55-1520-240-10). Troubleshoot rotor system (TM 55-1520-240-T). Repeat steps 1 through 9. If track is unsatisfactory, repeat steps 7 through 9.


13
12
11
10
14
HELICOPTER NO.
DATE
GROUND TRA
STROBEX TRA
FORWARD HEAD
CORRECTIONS
RED
GREEN
YELLOW
VERTICAL ACCELEROMETER(130KIAS) IPS
20X51
D145-10794-SPA

GO TO NEXT PAGE

11. **Set switch (9) to AFT VERTICAL.**
12. Repeat steps 8 to **tune balancer.**
13. **Read vertical vibration on IPS meter (13).** Record reading in aft head section of Tracking Card (14). If reading is less than 1.0 ips go to step 15. If reading is more than 1.0 ips, go to step 14.
14. If vertical vibration exceeds 1.0 ips, recheck aft blade track (Task 5-141). If track is satisfactory, have pilot land helicopter (TM 55-55-1520-240-10). Troubleshoot rotor system (TM 55-1520-240-T). Repeat steps 1 through 13. If track is unsatisfactory, repeat steps 11 through 13.


9
13
9
14
CK NO.
IN-FLIGHT NO.
TRACKED BY
CKING CARD
AFT HEAD
CORRECTIONS
RED
GREEN
YELLOW
VERTICAL ACCELEROMETER(130KIAS) IPS
20X51
D145-10795-6PA

GO TO NEXT PAGE

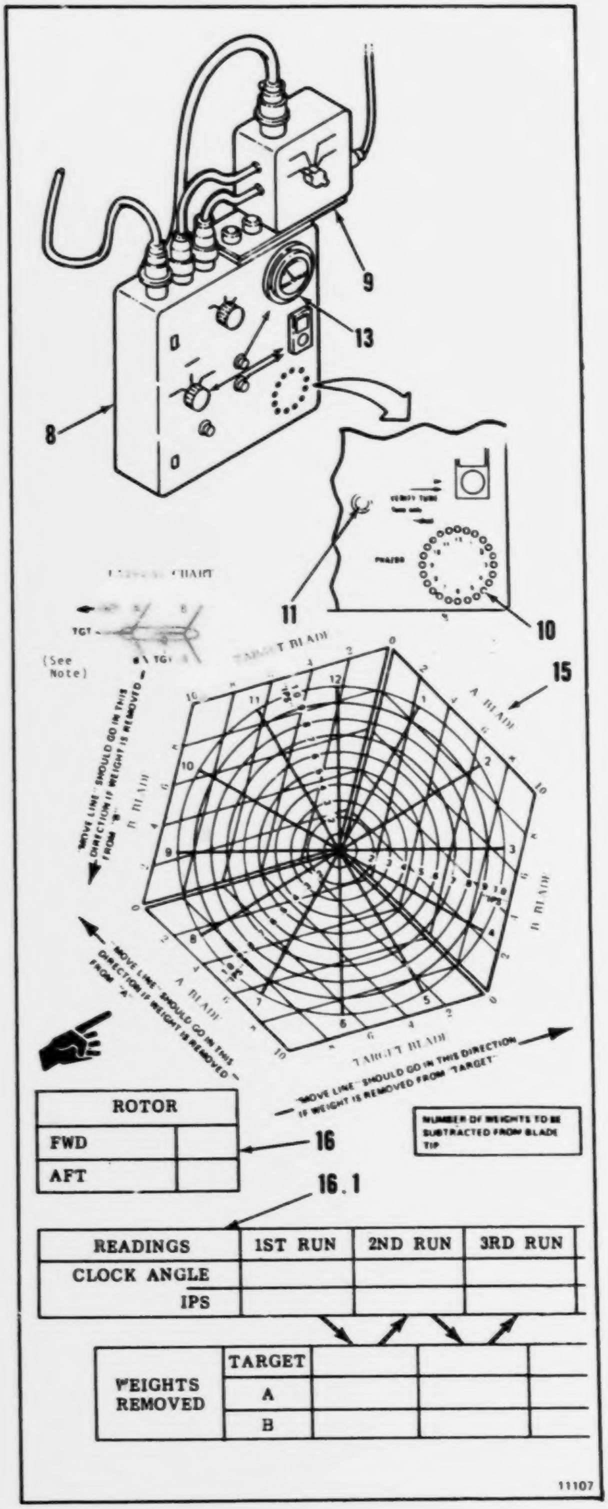
5-142 IN-FLIGHT BALANCING (Continued) 5-142

15. **Have pilot hover helicopter at 100 percent (225 rpm).**
16. **Set switch (9) to FWD LATERAL.**
17. Repeat step 8 to **tune balancer (8).**
18. On lateral balance chart (15), check FWD column of ROTOR box (16). **Mark clock angle of PHAZOR light (10)** that comes on in CLOCK ANGLE column of READINGS box (16.1).

NOTE

See blank balance chart on last page.

19. **Record reading from IPS meter (13) in IPS column of READINGS box (16.1).**
20. **Plot ips at clock angle on chart (15)** as follows:
    a. Find clock angle of light (10) on outer circle of chart (15).
    b. Follow line toward center circle to IPS meter reading.
    c. Plot ips.
21. **Set switch (9) to AFT LATERAL.**
22. Repeat step (8) to **tune balancer (8).**
23. Check AFT column of ROTOR box (16). **Mark clock angle of PHAZOR light (10)** that comes on in CLOCK ANGLE column of READINGS box (16.1).
24. **Record reading on IPS meter (13) in IPS column of READINGS box (16.1).**
25. **Plot IPS** at clock angle on chart (15). Refer to step 20.
26. Have pilot land helicopter and stop engines (TM 55-1520-240-10).
27. Note IPS values in FWD and AFT READINGS boxes (16.1). If both values are 0.2 ips or less, go to FOLLOW-ON MAINTENANCE.
28. If either value in step 27 exceeds 0.2 ips, go to step 29.


9
13
8
11
10
15
16
16.1
(See Note)
TARGET BLADE
A BLADE
B BLADE
"MOVE LINE" SHOULD GO IN THIS DIRECTION IF WEIGHT IS REMOVED FROM "A"
"MOVE LINE" SHOULD GO IN THIS DIRECTION IF WEIGHT IS REMOVED FROM "TARGET"
NUMBER OF WEIGHTS TO BE SUBTRACTED FROM BLADE TIP
PHAZOR
11107

ROTOR	
FWD	
AFT	

READINGS	1ST RUN	2ND RUN	3RD RUN
CLOCK ANGLE			
IPS			

WEIGHTS REMOVED	TARGET			
	A			
	B			

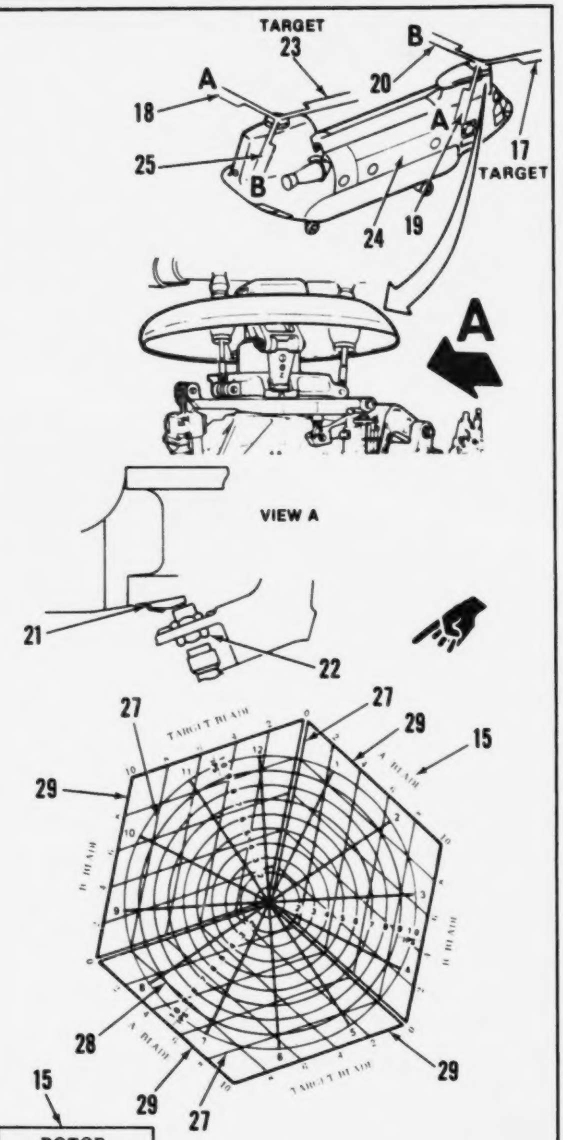
5-142 IN-FLIGHT BALANCING (Continued) 5-142

29. Attach tiedown lines to one forward and one aft blade (17 and 18) (Task 1-26).
30. Open pylon and forward work platforms (Task 2-2).

NOTE

Magnetic phase detector and double impulse bracket are on forward swashplate only.

31. Have helper turn blades (17, 19, and 20) until double interrupter (21) is over phase detector (22).
    a. Forward blade (17) is forward target blade.
    b. Blade (23) over fuselage (24) is aft target blade.
    c. Blade (19) is forward A blade.
    d. Blade (20) is forward B blade.
    e. Blade (18) is aft A blade.
    f. Blade (25) is aft B blade.
32. **Determine weight changes** as follows:
    a. Mark where readings from ips box and clock angle columns of READINGS box (16.1) cross on FWD ROTOR chart (15). Refer to step 20.
    b. Draw two lines from ips plot. Draw one in same direction as line (27). Draw one in same direction as line (28) for the sector. Don't cross double lines.
    c. Note where lines meet outer edges of grid (29). At edges, read numbers of weights, and blades from which weights are to be removed. Go to nearest full number of weights.
    d. Mark numbers from step c. in WEIGHTS REMOVED box (30) for blade.
    e. Repeat steps a. thru d. on AFT ROTOR chart.



16.1

ROTOR	
FWD	
AFT	

READINGS	1ST RUN	2ND RUN	3RD RUN
CLOCK ANGLE			
IPS			

30

WEIGHTS REMOVED	TARGET			
	A			
	B			

11108

GO TO NEXT PAGE

5-142 IN-FLIGHT BALANCING (Continued) 5-142

ADJUST BALANCING WEIGHTS

WARNING

Do not install more than 10 weights on a blade. Too many weights can cause damage to equipment and injury to personnel.

WARNING

Do not adjust weights on wrong blade. Vibration levels can be increased. Damage to equipment and injury to personnel could result.

33. **Adjust balancing weights (31)** as follows:

   a. Identify target, A, or B blade (17, 18, 19, 20, 23 or 25) on which weights are to be adjusted.
   b. Remove lockwire. Remove four socket head screws (32) and washers (33) from tip cover (34).
   c. Remove target (35).
   d. Remove tip cover (34).
   e. Remove four nuts (36) and washers (37).

NOTE

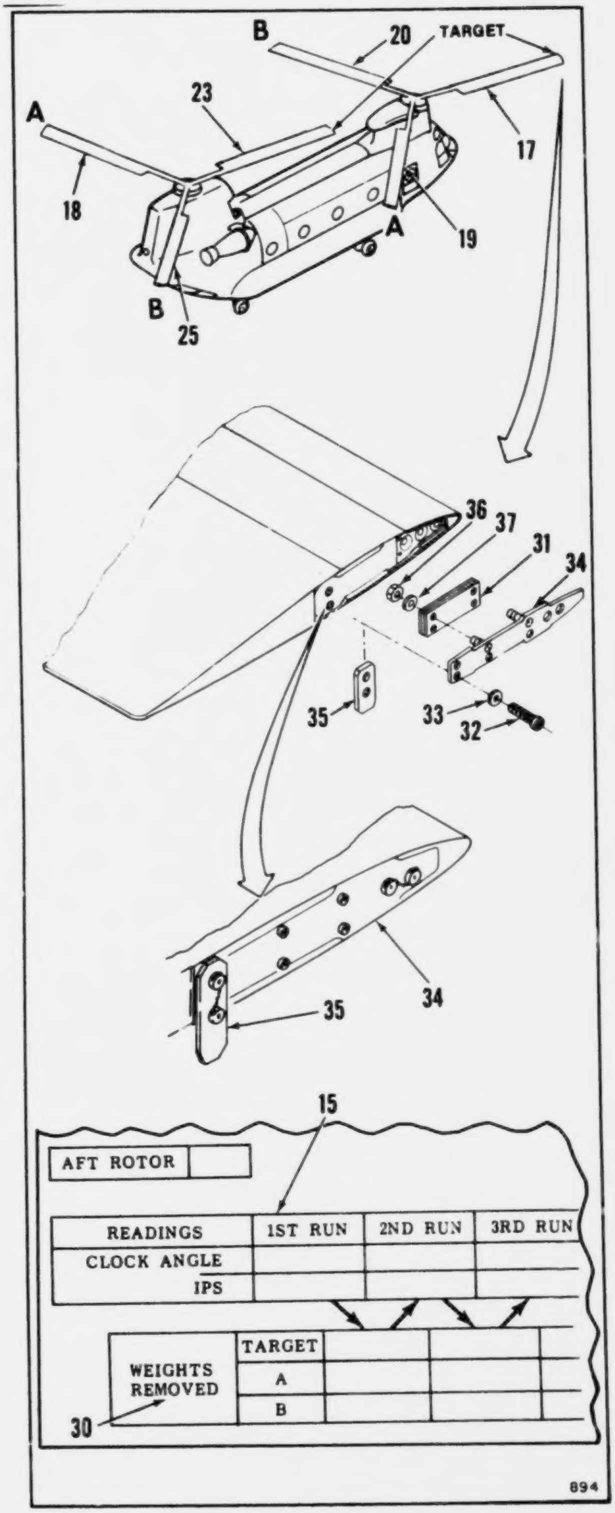
If the number of weights to be removed from a blade is greater than the number of weights installed, add an equal number of weights to each blade.

   f. Install weights (31), if needed. Remove number of weights marked in Weights Removed box (30) of chart (15).

NOTE

Vibrex weights removed during balancing should be secured together and tagged for identification.

   g. Install washers (37) and nuts (36). **Torque nuts to 60 inch-pounds.**
   h. Install tip cover (34).
   i. Install target (35).
   j. Install four socket head screws (32) and washers (33). **Torque screws to 175 inch-pounds.**
   k. Lockwire screws (32). Use lockwire (E233).


B
20
TARGET
A
23
17
18
A
19
B
25
36
37
31
34
35
33
32
34
35
15
AFT ROTOR
READINGS
1ST RUN
2ND RUN
3RD RUN
CLOCK ANGLE
IPS
WEIGHTS REMOVED
TARGET
A
B
30
894

GO TO NEXT PAGE

34. Use following example as guide when more than one balancing run is required:

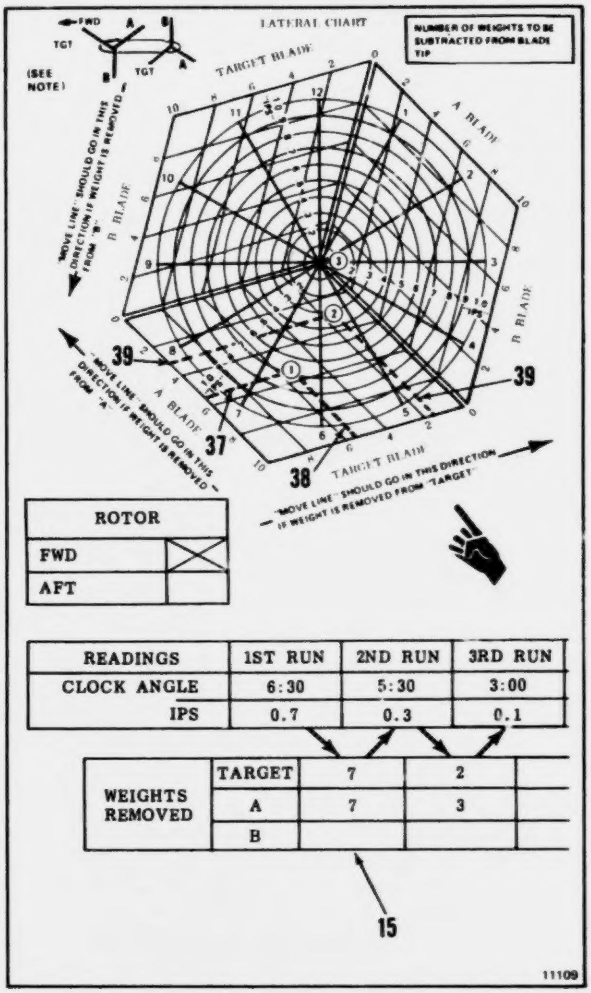
   a. On run 1, IPS meter reading of 0.7 at 6:30 o'clock angle is shown at point 1. Draw two lines (37 and 38) from this point to edge of grid on chart (15), in same direction as grid. Ends of lines (37 and 38) show that five weights must be removed from A blade, and six from target blade. Blade balance run is repeated.

   b. On run 2, after weights (step a) are removed, IPS reading is 0.3 at 5:30 o'clock angle at point 2. Lines (39) from point 2 show that three weights must be removed from A blade, and one from target blade. Balancing run is then repeated.

NOTE

If, on run 2, A blade has less than 3 weights installed, add an equal number of weights to all blades. Then deduct 3 weights from A blade and 2 from target blade before actual weight installation.

   c. On run 3, IPS reading of 0.1 at 3 o'clock angle is shown at point 3. This reading indicates that no further weight adjustment is needed.


FWD
A
B
TGT
(SEE NOTE)
LATERAL CHART
NUMBER OF WEIGHTS TO BE SUBTRACTED FROM BLADE TIP
TARGET BLADE
A BLADE
B BLADE
"MOVE LINE" SHOULD GO IN THIS DIRECTION IF WEIGHT IS REMOVED FROM "B"
"MOVE LINE" SHOULD GO IN THIS DIRECTION IF WEIGHT IS REMOVED FROM "A"
"MOVE LINE" SHOULD GO IN THIS DIRECTION IF WEIGHT IS REMOVED FROM "TARGET"
IPS
①
②
③
37
38
39
39
15
11109

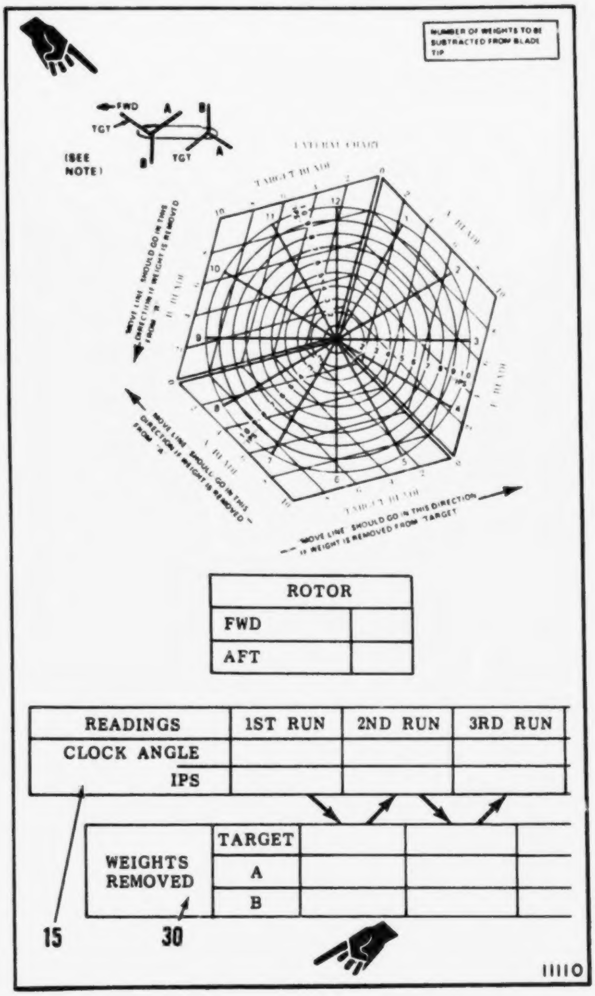
ROTOR	
FWD	☒
AFT	☐

READINGS	1ST RUN	2ND RUN	3RD RUN
CLOCK ANGLE	6:30	5:30	3:00
IPS	0.7	0.3	0.1

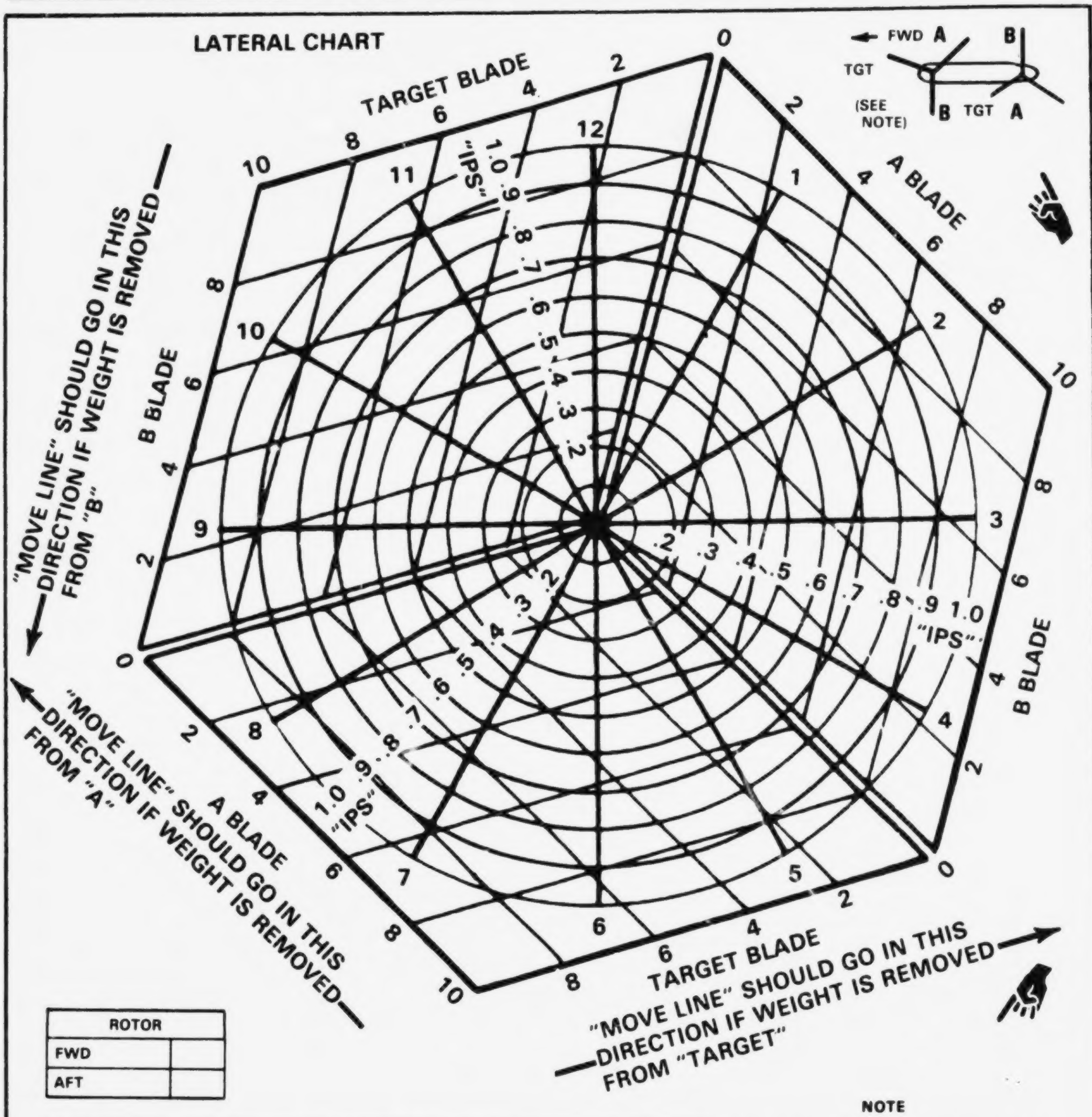
WEIGHTS REMOVED	TARGET	7	2	
	A	7	3	
	B			

5-142 IN-FLIGHT BALANCING (Continued) 5-142

35. Check that weight adjustments, marked in weights removed box (30) of chart (15), are completed.
36. **Repeat steps 1 through 29 until IPS reading on chart (15) is less than 0.2 on both rotors.**
37. Have pilot land helicopter and stop engines (TM 55-1520-240-10).
38. **Record all blade tip weight adjustments by blade serial number, on DA Form 2408-13.**
39. **Record final weight adjustments for each blade in block 8 of DA Form 2408-16.**


NUMBER OF WEIGHTS TO BE SUBTRACTED FROM BLADE TIP
FWD
TGT
A
B
(SEE NOTE)
LATERAL CHART
TARGET BLADE
A BLADE
B BLADE
IPS
MOVE LINE SHOULD GO IN THIS DIRECTION IF WEIGHT IS REMOVED FROM B
MOVE LINE SHOULD GO IN THIS DIRECTION IF WEIGHT IS REMOVED FROM A
MOVE LINE SHOULD GO IN THIS DIRECTION IF WEIGHT IS REMOVED FROM TARGET
ROTOR
FWD
AFT
READINGS
1ST RUN
2ND RUN
3RD RUN
CLOCK ANGLE
IPS
WEIGHTS REMOVED
TARGET
A
B
15
30
11110

GO TO NEXT PAGE



ROTOR	
FWD	
AFT	

TRACK	1ST RUN	2ND RUN	3RD RUN	4TH RUN	5TH RUN
CLOCK ANGLE					
IPS					

NOTE

FORWARD B BLADE POINTS STRAIGHT OUT TO LEFT WHEN DOUBLE INTERRUPTER IS OVER MAGNETIC PICKUP.

WEIGHTS REMOVED					
	TARGET				
	A				
	B				

NUMBER OF WEIGHTS TO BE SUBTRACTED FROM BLADE TIP.

11111

FOLLOW-ON MAINTENANCE:

Remove tracking and balancing equipment (Task 5-143).

END OF TASK

5-142.1 COMPUTER-AIDED HOVER/IN-FLIGHT TRACKING AND BALANCING 5-142.1

INITIAL SETUP

Applicable Configurations:
All

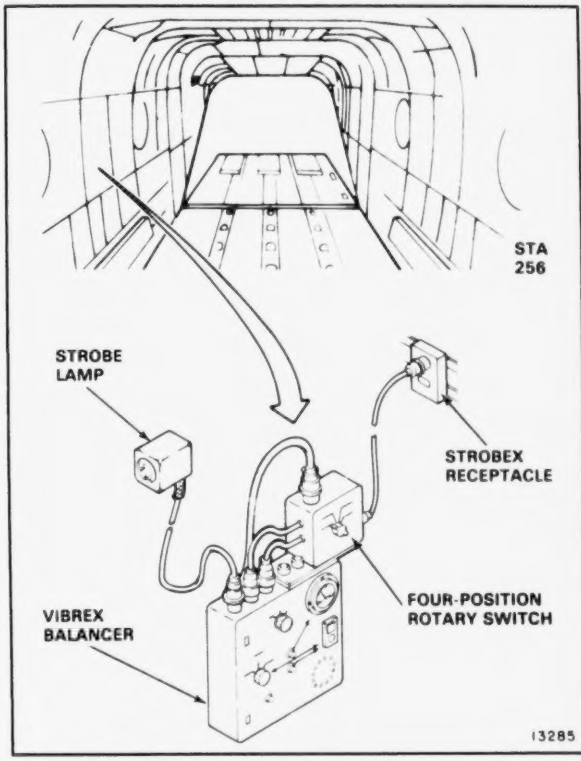
Tools:
None

Materials:
Strobex Tracking Cards

Personnel Required:
Medium Helicopter Repairer
Army Rotary-Wing Aviator (2)

References:
TM 55-1520-240-10
TM 55-1520-240-T
Task 1-26
Task 5-94
Task 5-142.3

Equipment Condition:
Helicopter Prepared for Computer-Aided Tracking and Balancing (Task 5-139)
Helicopter Ground Tracked (Task 5-140)


STA 256
STROBE LAMP
STROBEX RECEPTACLE
FOUR-POSITION ROTARY SWITCH
VIBREX BALANCER
13285

GO TO NEXT PAGE

5-142.1 COMPUTER-AIDED HOVER/IN-FLIGHT TRACKING AND BALANCING (Continued) 5-142.1

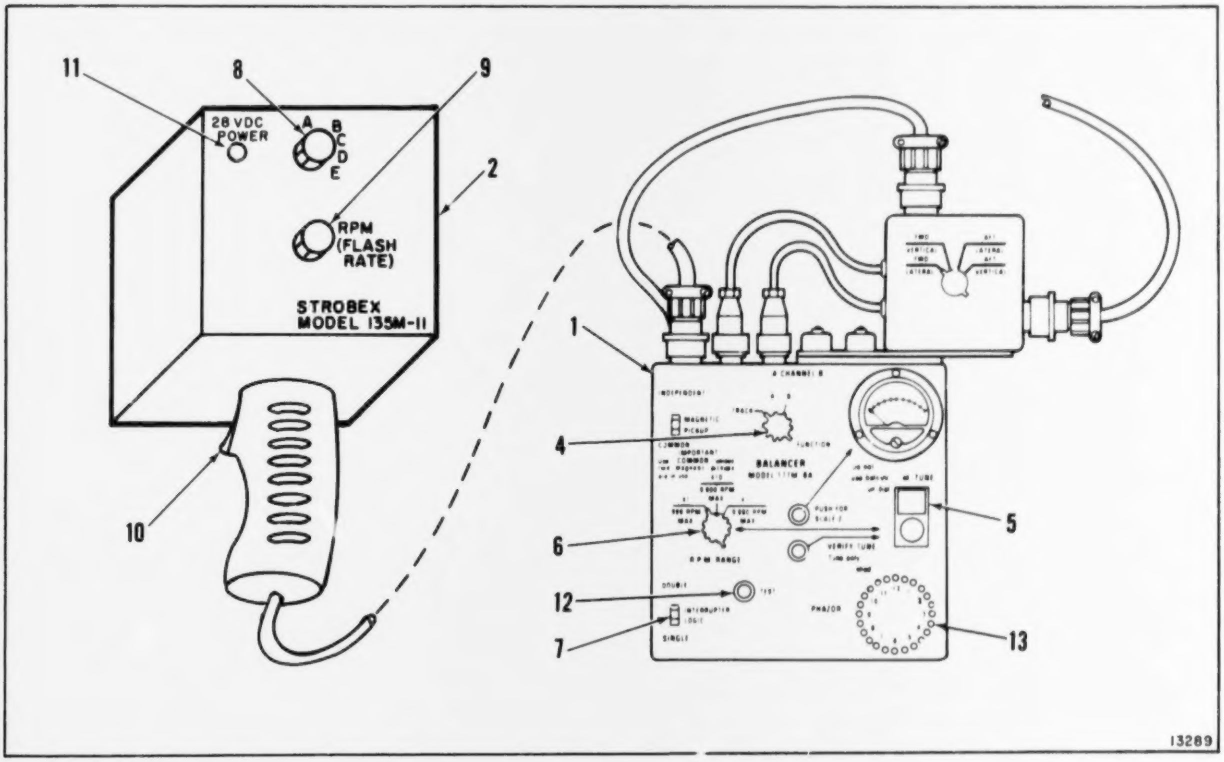
NOTE

Perform this task only if a computer will be used to evaluate flight data.

1. **Have pilot hover helicopter into the wind at 100 percent rotor rpm.**

EQUIPMENT OPERATIONAL CHECK

2. **Perform operational check** of balancer (1) and strobe lamp (2) as follows:
   a. **Set MAGNETIC PICKUP switch (3)** on balancer (1) **to COMMON.**
   b. **Set FUNCTION switch (4) to TRACK.**
   c. **Set RPM TUNE dial (5) to 225.**
   d. **Set RPM RANGE switch (6) to X1.**
   e. **Set INTERRUPTER LOGIC switch (7) to DOUBLE.**
   f. **Set selector switch (8)** on strobe lamp (2) **to A.**
   g. **Set RPM dial (9) to 268.**
   h. Point strobe lamp (2) down. Press trigger (10). Check that tracker flashes at steady 3-per-rev rate. Check that green 28 VDC power light (11) comes on.
   i. Press TEST switch (12) on balancer (1). Check that 12, 4, and 8 o'clock lights on PHAZOR (13) come on. If they do not, do not continue. Troubleshoot balancer (TM 55-1520-240-T).


11
8
9
28 VDC POWER
A
B
C
D
E
2
RPM (FLASH RATE)
STROBEX MODEL 135M-11
10
1
4
6
12
7
5
13
MAGNETIC PICKUP
TRACK
FUNCTION
COMMON
BALANCER
PUSH FOR
VERIFY TUNE
RPM RANGE
DOUBLE
TEST
INTERRUPTER LOGIC
SINGLE
PHAZOR
13289

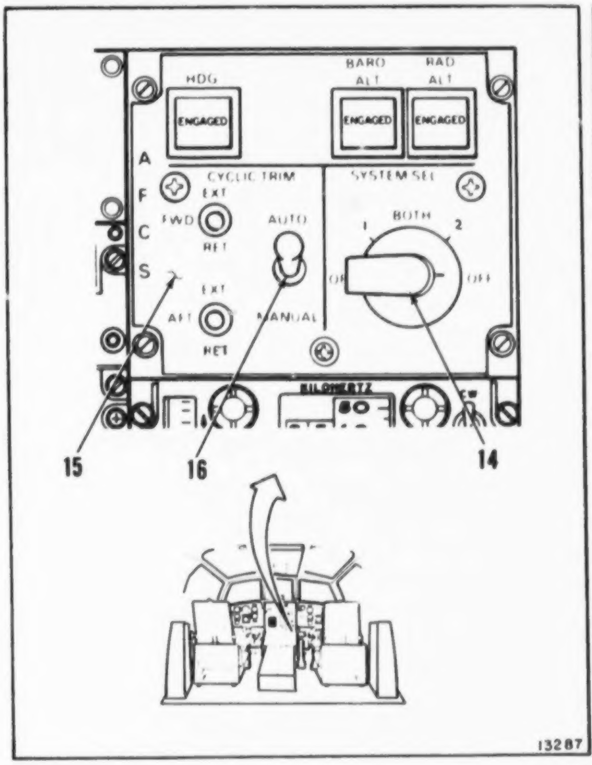
GO TO NEXT PAGE

5-142.1 COMPUTER-AIDED HOVER/IN-FLIGHT TRACKING AND BALANCING (Continued) 5-142.1

CAUTION

Make sure cyclic trim actuators are not extended during tracking. Damage to droop stops and excess stress on the aft blades and rotor shaft will result.

3. **Set SYSTEM SEL switch (14) on AFCS PANEL (15) to OFF. Check that CYCLIC TRIM switch (16) on AFCS panel is set to AUTO.**

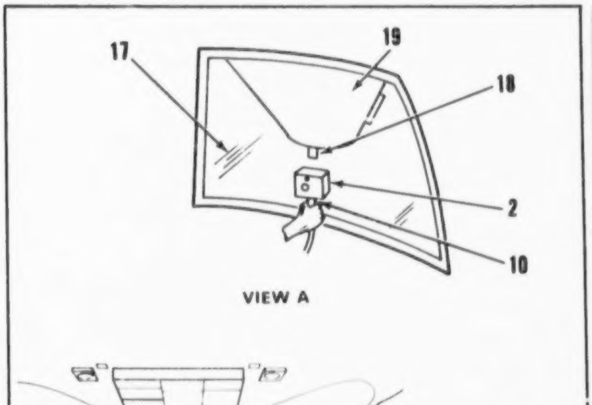

HDG
BARO ALT
RAD ALT
ENGAGED
ENGAGED
ENGAGED
A
F
C
S
CYCLIC TRIM
EXT
FWD
RET
EXT
AFT
RET
AUTO
MANUAL
SYSTEM SEL
BOTH
1
2
OFF
OFF
KILOHERTZ
15
16
14
13287

FORWARD BLADE HOVER TRACKING

4. **Point strobe lamp (2) through pilot's windshield (17)** at 1 o'clock.
5. Sight across top of lamp (2). Press trigger (10). **Direct light flashes toward targets (18) on forward blades (19).** Sweep tracker from side-to-side in W pattern until tip targets are detected.

NOTE

Horizontal spread of tape strips as seen with tracker has no effect on track. Always use center blade as main focal point. Focus on pattern formed by center target and one other target at a time. Looking at pattern of all three targets at once is difficult.


17
19
18
2
10
VIEW A
A
17
13288

GO TO NEXT PAGE

5-142.1 COMPUTER-AIDED HOVER/IN-FLIGHT TRACKING AND BALANCING (Continued) 5-142.1

NOTE

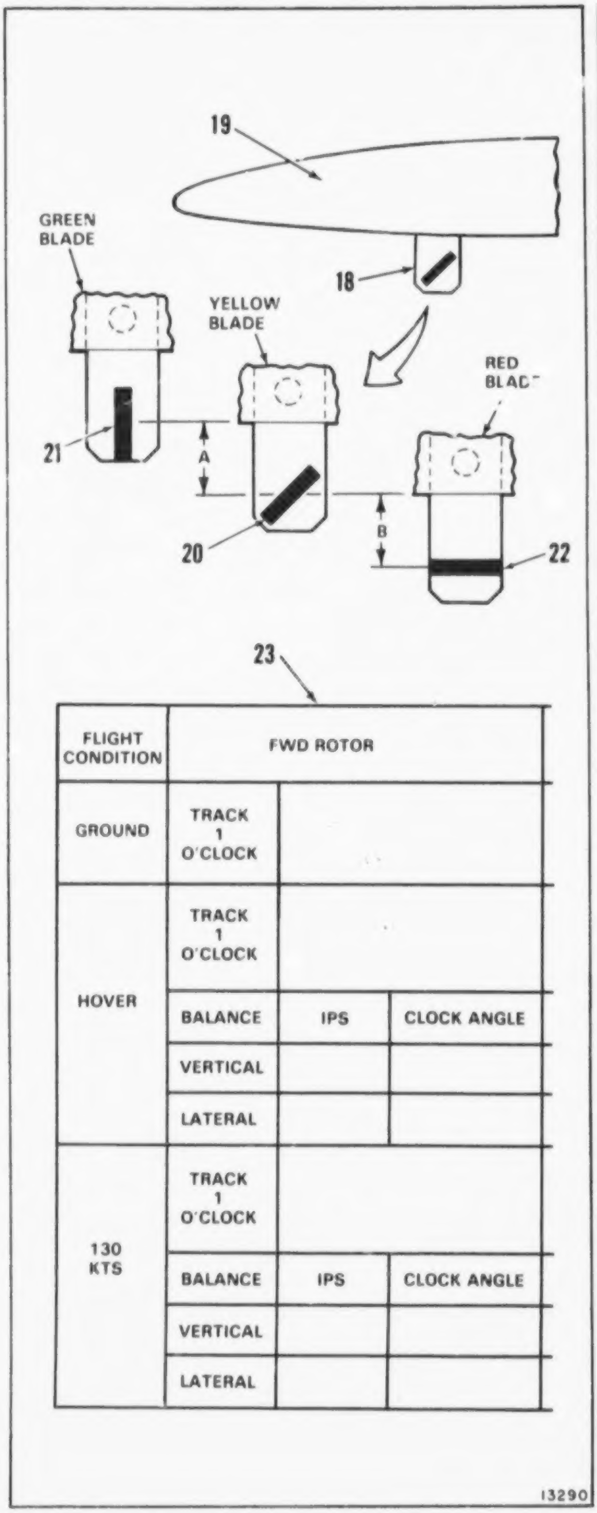
- Green blade (vertical tape) is on pitch housing with green band. Red blade (horizontal tape) is on pitch housing with red band. Yellow blade (diagonal tape) is on pitch housing with yellow band.
- If one or two blades have been replaced on the same rotor head, track to a blade that was not changed.

6. **View pattern of tapes (20, 21, and 22)** on targets (18). **Note which tape is in center.** Track to center blade (19), unless center blade is a replacement blade. Yellow blade is shown in center here.
7. Observe relative vertical positions of high and center blades. **Estimate distance (A)** between centers of tape markers (20) and (21).

NOTE

Tracking tape is 0.20 inch wide and 1.0 inch long. Five tape widths equal 1.0 inch.

8. Mark high and center blade tape patterns on Track and Balance Worksheet (23) in their relative positions. **Record estimated distance (A)** between tape centers.
9. Observe relative vertical positions of center and low blades. **Estimate distance (B)** between centers of tape markers (20) and (22).
10. Mark low blade tape pattern on worksheet (23) in its position relative to center blade. **Record estimated distance (B)** between tape centers.
11. **Add total distance (A + B)** between markers (21) and (22).



FLIGHT CONDITION	FWD ROTOR		
GROUND	TRACK 1 O'CLOCK		
HOVER	TRACK 1 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE
	VERTICAL		
	LATERAL		
130 KTS	TRACK 1 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE
	VERTICAL		
	LATERAL		

GO TO NEXT PAGE

5-142.1 COMPUTER-AIDED HOVER/IN-FLIGHT TRACKING AND BALANCING (Continued) 5-142.1

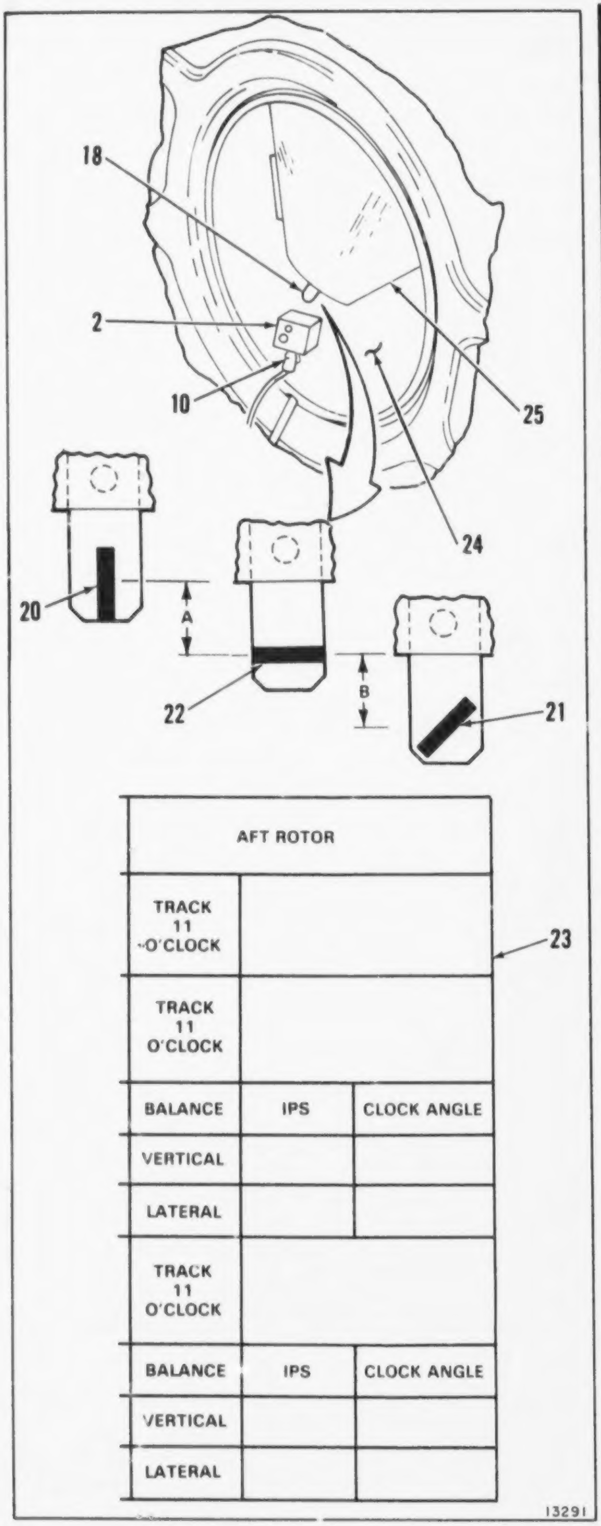
AFT BLADE HOVER TRACKING

12. Point lamp (2) through aft left window (24) at 11 o'clock.
13. Sight across lamp (2). Press trigger (10). **Direct light flashes toward targets (18) on aft blades (25).** Sweep lamp from side-to-side in W pattern until targets are detected.
14. **View pattern of tapes (20, 21, and 22)** on targets (180). **Note which tape is in center.** Track to center blade unless center blade is a replacement blade. Red blade is shown in center here.
15. Observe relative vertical positions of high and center blades. **Estimate distance (A)** between centers of tape markers (20) and (22).

NOTE

Tracking tape is 0.20 inch wide and 1.0 inch long. Five tape widths equal 1.0 inch.

16. Mark high and center blade tape patterns on Track and Balance Worksheet (23) in their relative positions. **Record estimated distance (A)** between tape centers.
17. Observe relative vertical positions of center and low blades. **Estimate distance (B)** between centers of tape markers (21) and (22).
18. Mark low blade tape pattern on worksheet (23) in its position relative to center blade. **Record estimated distance (B)** between tape centers.
19. **Add total distance (A + B)** between markers (20) and (21).


18
2
10
25
24
20
A
22
B
21
23
AFT ROTOR
TRACK 11 O'CLOCK
TRACK 11 O'CLOCK
BALANCE
IPS
CLOCK ANGLE
VERTICAL
LATERAL
TRACK 11 O'CLOCK
BALANCE
IPS
CLOCK ANGLE
VERTICAL
LATERAL
13291

GO TO NEXT PAGE

5-142.1 COMPUTER-AIDED HOVER/IN-FLIGHT TRACKING AND BALANCING (Continued) 5-142.1

HOVER BALANCING

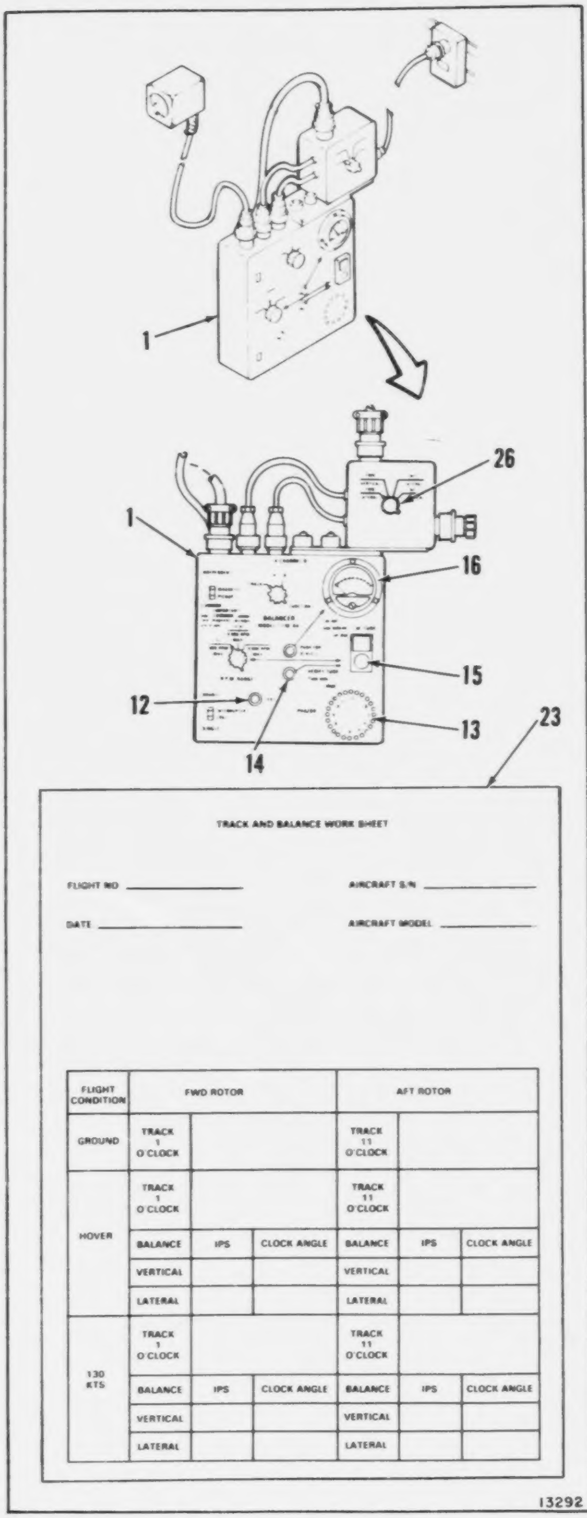
20. **Press balancer TEST switch (12). Check that PHAZOR lights (13) come on at 12, 4, and 8 o'clock positions.** Lights must come on to verify that balancer (1) works.
21. Tune balancer (1) as follows:

NOTE

Balancer must be tuned before recording vibration data. If it is not, data will not be valid. Adjustments made on the basis of invalid data may increase vibration levels.

   a. Set switch (26) to FWD LATERAL. Note clock angle of PHAZOR light (13) that is on.
   b. Press VERIFY TUNE switch (14). Note clock position of PHAZOR light (13) that comes on. If same light is on as in step a., go to step 22. If same light is not on, go to step c.
   c. Press and hold VERIFY TUNE switch (14) and adjust RPM TUNE dial (15). If PHAZOR light (13) moves clockwise when VERIFY TUNE switch is pressed, adjust RPM TUNE dial counterclockwise. If PHAZOR light moves counterclockwise when VERIFY TUNE switch is pressed, adjust RPM TUNE dial clockwise.
   d. Repeat steps a. thru c. until PHAZOR light (13) comes on at same clock angle before and after VERIFY TUNE switch (14) is pressed.

22. **Note clock angle** of PHAZOR light (13) **and reading on IPS meter (16). Record data** in FWD ROTOR HOVER LATERAL boxes of Track and Balance worksheet (23).



TRACK AND BALANCE WORK SHEET

FLIGHT NO ____________ AIRCRAFT S/N ____________

DATE ____________ AIRCRAFT MODEL ____________

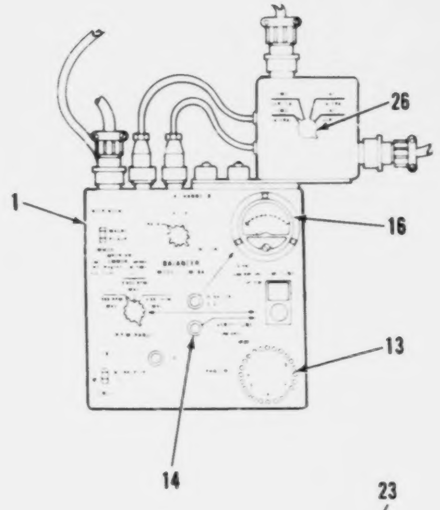
FLIGHT CONDITION	FWD ROTOR			AFT ROTOR		
GROUND	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
HOVER	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE	BALANCE	IPS	CLOCK ANGLE
	VERTICAL			VERTICAL		
	LATERAL			LATERAL		
130 KTS	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE	BALANCE	IPS	CLOCK ANGLE
	VERTICAL			VERTICAL		
	LATERAL			LATERAL		

13292

GO TO NEXT PAGE

5-142.1 COMPUTER-AIDED HOVER/IN-FLIGHT TRACKING AND BALANCING (Continued) 5-142.1

23. **Set switch (26) to AFT LATERAL.**
24. Repeat step 21. to **tune balancer.**
25. **Note clock angle** of PHAZOR light (13) **and reading on IPS meter (16). Record data** in AFT ROTOR HOVER LATERAL boxes of Track and Balance worksheet (23).
26. **Set switch (26) to FWD VERTICAL.**
27. Repeat step 21. to **tune balancer.**
28. **Note clock angle** of PHAZOR light (13) **and reading on IPS meter (16). Record data** in FWD ROTOR HOVER VERTICAL boxes of worksheet (23).
29. **Set switch (26) to AFT VERTICAL.**
30. Repeat step 21. to **tune balancer.**
31. **Record clock angle** of PHAZOR light (13) **and reading on IPS meter (16)** in AFT ROTOR HOVER VERTICAL boxes of worksheet (23).



TRACK AND BALANCE WORK SHEET

FLIGHT NO ________ AIRCRAFT S/N ________

DATE ________ AIRCRAFT MODEL ________

FLIGHT CONDITION	FWD ROTOR			AFT ROTOR		
GROUND	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
HOVER	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE	BALANCE	IPS	CLOCK ANGLE
	VERTICAL			VERTICAL		
	LATERAL			LATERAL		
130 KTS	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE	BALANCE	IPS	CLOCK ANGLE
	VERTICAL			VERTICAL		
	LATERAL			LATERAL		

13293

GO TO NEXT PAGE

5-142.1 COMPUTER-AIDED HOVER/IN-FLIGHT TRACKING AND BALANCING (Continued) 5-142.1

32. Evaluate vibration levels as follows:

    a. If all vibration levels are less than 1.0 IPS, continue with an in-flight track and balance at 130 knots (step 34.).

    b. If any recorded vibration level is 1.0 IPS or more, have the pilot land the helicopter and shut down the engines (TM 55-1520-240-10).

33. **If** rotor blade tip path **spread (A + B) is more than 1/2 inch, adjust pitch links** on forward or aft head as follows:

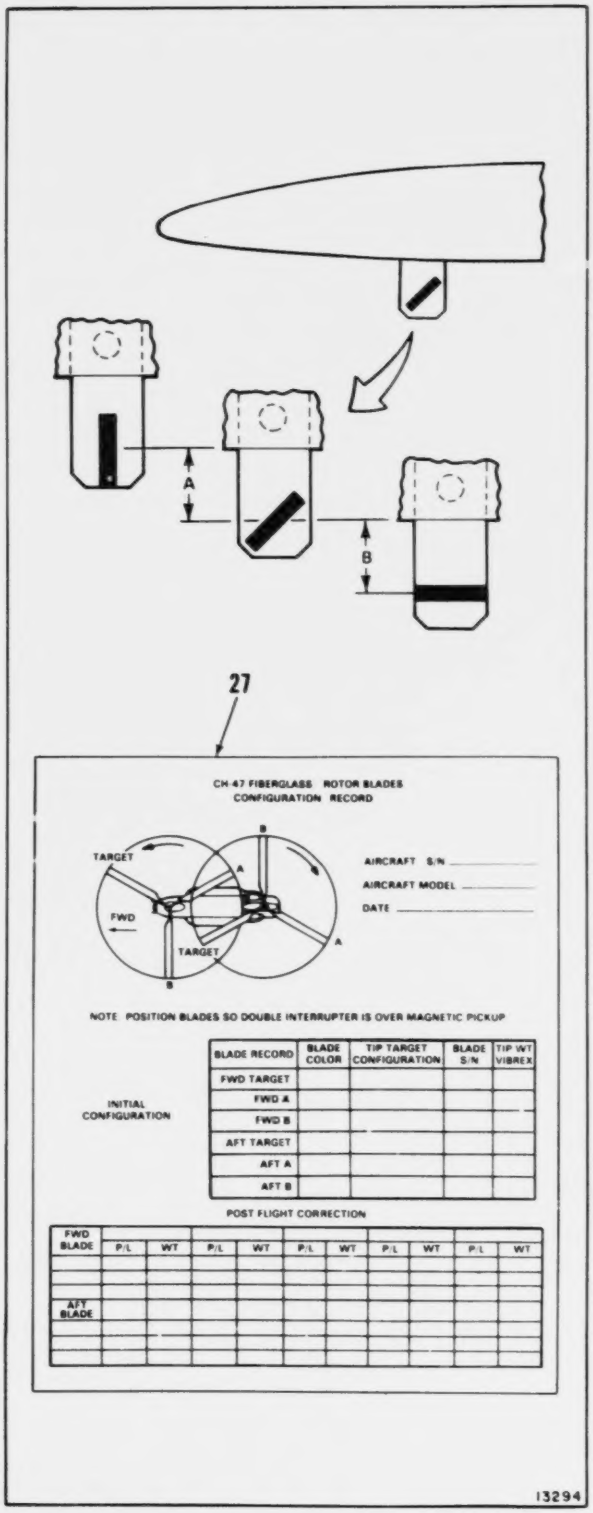
NOTE

One mark of pitch link adjustment changes blade track in hover or forward flight 0.2 inch.

    a. **Multiply distance A by 5.** This is the number of marks of pitch link adjustment needed to bring high blade down into track. **Record number** in P/L box of POST FLIGHT CORRECTION box of Configuration Record (27).

    b. **Multiply distance B by 5.** This is the number of marks of pitch link adjustment need to bring low blade up into track. **Record number** as in step a.

    c. When you have recorded all numbers for forward and aft blades, **adjust pitch links (Task 5-94).**



CH-47 FIBERGLASS ROTOR BLADES
CONFIGURATION RECORD

AIRCRAFT S/N ____________

AIRCRAFT MODEL ____________

DATE ____________

NOTE POSITION BLADES SO DOUBLE INTERRUPTER IS OVER MAGNETIC PICKUP

INITIAL CONFIGURATION

BLADE RECORD	BLADE COLOR	TIP TARGET CONFIGURATION	BLADE S/N	TIP WT VIBREX
FWD TARGET				
FWD A				
FWD B				
AFT TARGET				
AFT A				
AFT B				

POST FLIGHT CORRECTION

FWD BLADE	P/L	WT	P/L	WT	P/L	WT	P/L	WT	P/L	WT
AFT BLADE										

GO TO NEXT PAGE

5-142.1 COMPUTER-AIDED HOVER/IN-FLIGHT TRACKING AND BALANCING (Continued) 5-142.1

IN-FLIGHT TRACKING

34. Have pilot fly helicopter straight and level at 130 knots and 100 percent rotor rpm.

35. Track blades in same manner as in hover (steps 4. through 19.).

IN-FLIGHT BALANCING

36. Check in-flight blade balance in same manner as in hover (steps 20. through 33.).

TRACK AND BALANCE CORRECTION

37. Use computer to determine corrections required for proper track and balance (Task 5-142.3).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-142.2 COMPUTER PREPARATION 5-142.2

INITIAL SETUP

Applicable Configurations:

All

Tools:

Sharp Pocket Computer PC-1500A or Equivalent

Sharp Printer CE-150 or Equivalent

Materials:

None

Personnel Required:

Medium Helicopter Repairer

References:

Task 5-142.7

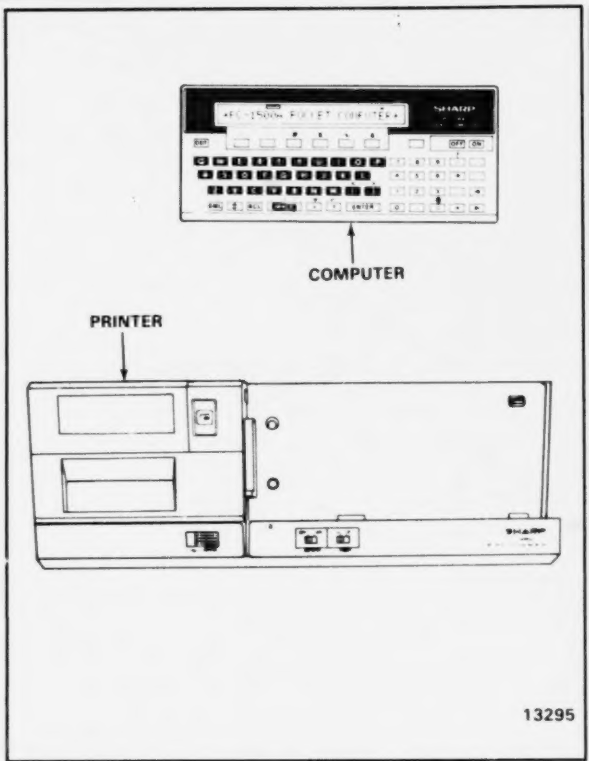
Task 5-142.8

Task 5-142.9

Task 5-142.10

Equipment Condition:

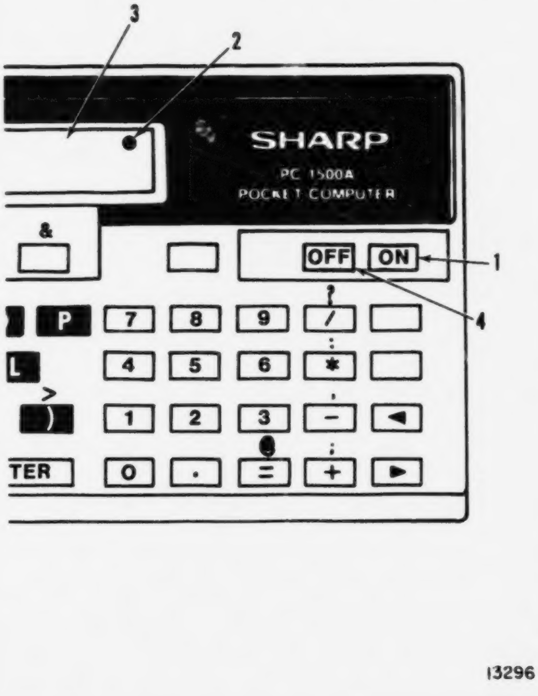
Off Helicopter Task


COMPUTER
PRINTER
13295

NOTE

Perform this task to check the computer for proper operation before taking it on a track and balance flight.

1. **Press ON** key (1). **Check that black dot (2) appears** in upper right corner of screen (3). If it does not, replace batteries (Task 5-142.9).
2. **Press OFF** key (4).


3
2
SHARP
PC 1500A
POCKET COMPUTER
OFF
ON
1
4
13296

GO TO NEXT PAGE

5-142.2 COMPUTER PREPARATION (Continued) 5-142.2

3. If printer (5) will be used, check it for proper operation as follows:

NOTE

Use printer whenever possible to provide a record of computations.

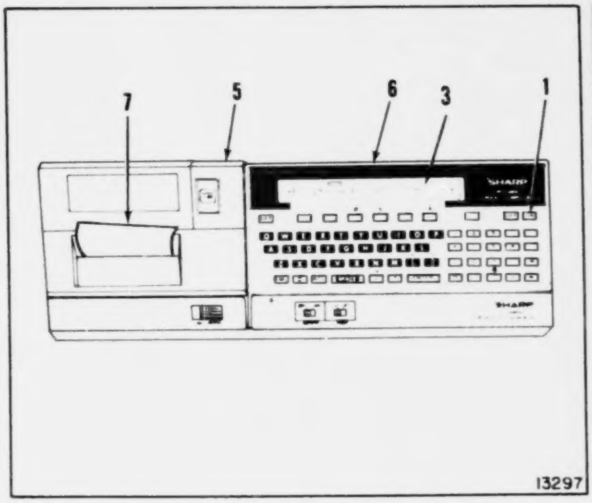
a. **Install printer (5)** on computer (6) (Task 5-142.7).

b. **Check that paper (7) is in printer (5).** Install new roll, if needed (Task 5-142.8).

c. **Press ON** key (1). If CHECK 6 appears on screen (3), printer batteries must be charged. (Refer to computer operating instructions.)

NOTE

It takes 15 hours to fully charge printer batteries. The printer will run for 4 hours on a full charge.



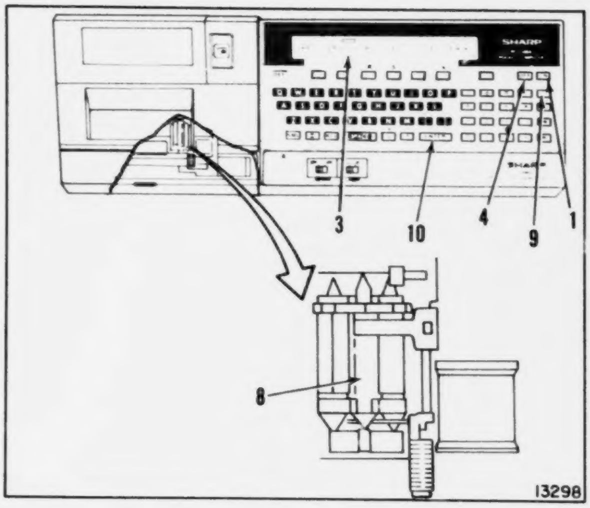
d. Check that printer pens (8) work properly as follows:

(1) **Press ON key (1) twice.** Screen (3) will show BREAK IN XXXX.

(2) **Press CL button (9), then ENTER key (10). Type T E S T and press ENTER key again.** Each pen (8) will draw a test square.

(3) If a pen (8) is defective, replace it (Task 5-142.10).

(4) **Press OFF** key (4).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-142.3 COMPUTER OPERATION 5-142.3

INITIAL SETUP

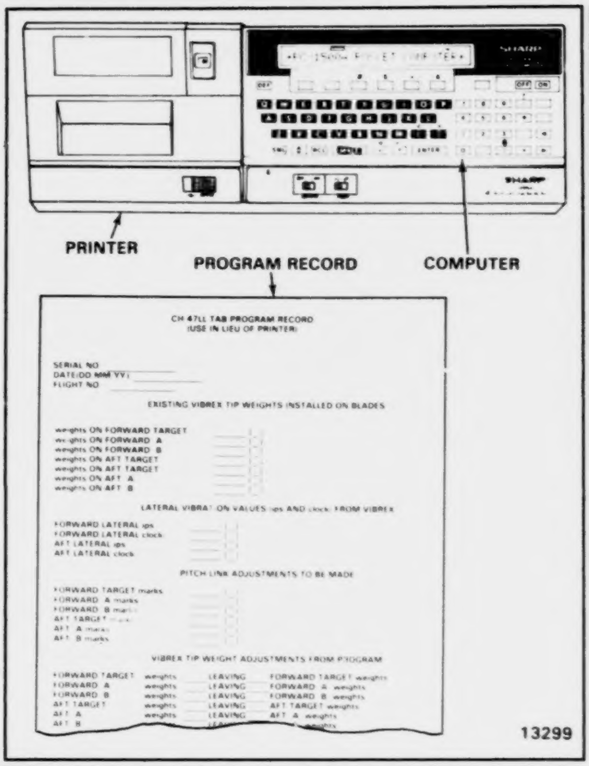
Applicable Configurations:
All

Tools:
Sharp Pocket Computer PC-1500A or Equivalent

Materials:
None

Personnel Required:
Medium Helicopter Repairer

Equipment Condition:
Track and Balance Data Recorded
Computer Prepared for Computation
(Task 5-142.2)



CH 47LL TAB PROGRAM RECORD
(USE IN LIEU OF PRINTER)

SERIAL NO ____
DATE(DD MM YY) ____
FLIGHT NO ____

EXISTING VIBREX TIP WEIGHTS INSTALLED ON BLADES

weights ON FORWARD TARGET ____
weights ON FORWARD A ____
weights ON FORWARD B ____
weights ON AFT TARGET ____
weights ON AFT TARGET ____
weights ON AFT A ____
weights ON AFT B ____

LATERAL VIBRATION VALUES ips AND clock FROM VIBREX

FORWARD LATERAL ips ____
FORWARD LATERAL clock ____
AFT LATERAL ips ____
AFT LATERAL clock ____

PITCH LINK ADJUSTMENTS TO BE MADE

FORWARD TARGET marks ____
FORWARD A marks ____
FORWARD B marks ____
AFT TARGET marks ____
AFT A marks ____
AFT B marks ____

VIBREX TIP WEIGHT ADJUSTMENTS FROM PROGRAM

FORWARD TARGET weights ____ LEAVING ____ FORWARD TARGET weights
FORWARD A weights ____ LEAVING ____ FORWARD A weights
FORWARD B weights ____ LEAVING ____ FORWARD B weights
AFT TARGET weights ____ LEAVING ____ AFT TARGET weights
AFT A weights ____ LEAVING ____ AFT A weights
AFT B

NOTE

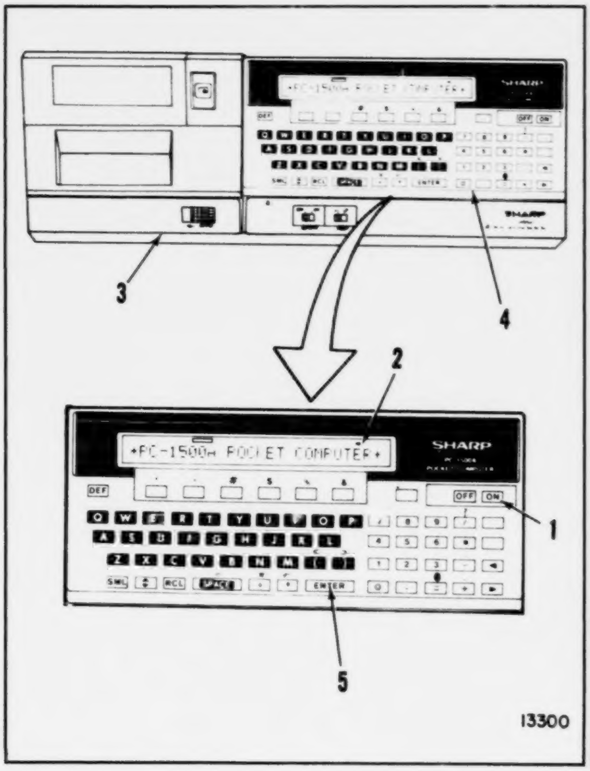
Before proceeding make sure the following data is available:

- Blade tip target positions.
- Pitch link length change.
- Lateral vibration amplitude and angle.

1. **Press ON** key (1). Screen (2) will show PRINTER ATTACHED (Y OR N)? **Press Y** (for Yes) **if printer (3) is attached** to computer (4). **If not, press N. Press ENTER** key (5).

NOTE

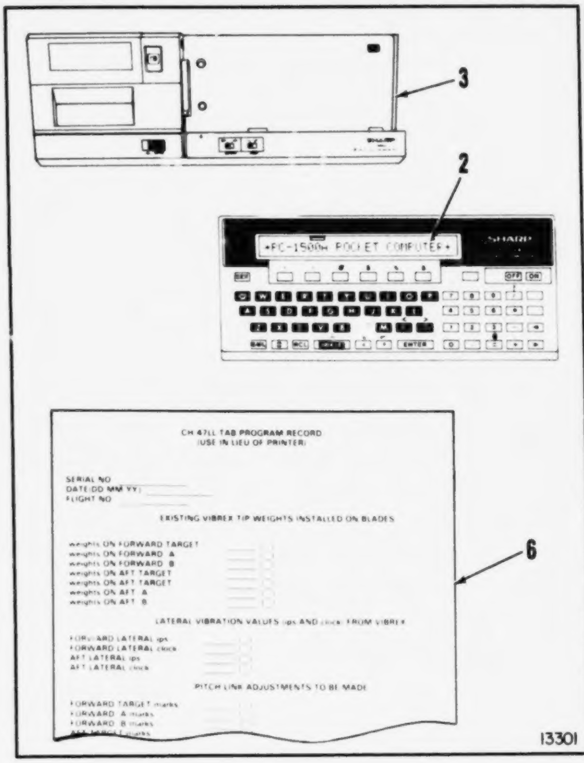
- A ? on the screen indicates that the computer is waiting for input.
- If you make a mistake while typing in data, do not press ENTER key. Press CL key and enter data again. If you already pressed ENTER, press OFF key, then ON key. Enter all data again.



GO TO NEXT PAGE

5-142.3 COMPUTER OPERATION (Continued) 5-142.3

2. **If you press N,** indicating no printer (3) attached, screen (2) will momentarily show CH-47 PITCH LINK VIBREX. **Transfer input data** on initial tip weight distribution, observed vibration values, and required pitch link adjustments **to Program Record (6).** Go to step 19.



CH 47LL TAB PROGRAM RECORD
(USE IN LIEU OF PRINTER)

SERIAL NO ______
DATE(DD MM YY) ______
FLIGHT NO ______

EXISTING VIBREX TIP WEIGHTS INSTALLED ON BLADES

weights ON FORWARD TARGET ______
weights ON FORWARD A ______
weights ON FORWARD B ______
weights ON AFT TARGET ______
weights ON AFT TARGET ______
weights ON AFT A ______
weights ON AFT B ______

LATERAL VIBRATION VALUES (ips AND clock) FROM VIBREX

FORWARD LATERAL ips ______
FORWARD LATERAL clock ______
AFT LATERAL ips ______
AFT LATERAL clock ______

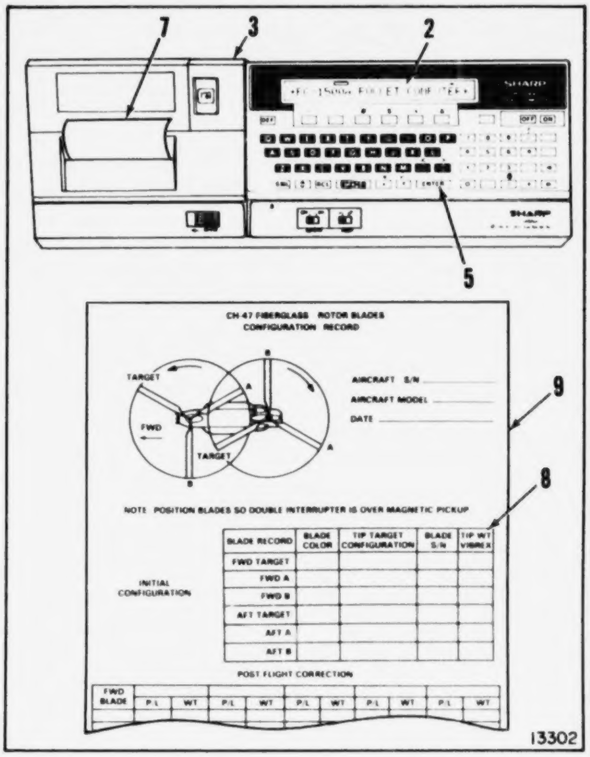
PITCH LINK ADJUSTMENTS TO BE MADE

FORWARD TARGET marks ______
FORWARD A marks ______
FORWARD B marks ______

GO TO NEXT PAGE

5-142.3 COMPUTER OPERATION (Continued) 5-142.3

3. If you pressed Y, CH-47 PITCH LINK VIBREX will print at top of paper (7) on printer (3). Screen (2) will show SERIAL NO.?
4. **Type in helicopter serial number and press ENTER** key (5). Screen (2) will show DATE:? (DD/MM/YY).
5. **Type in current day/month/year** in two-digit form **and press ENTER** key (5). Screen (2) will show FLIGHT NO.? Type in flight number and press ENTER key.
6. Screen (2) will show INPUT NO. OF WTS. ON BLADES, then WTS ON FWD TARGET=?
7. **Type in the number of existing balance weights on the forward target blade.** Refer to INITIAL CONFIGURATION BLOCK (8) of Configuration Record (9). **Press ENTER** key (5). Screen (2) will show WTS ON FWD -A- =?
8. **Type in number of existing balance weights on forward A blade** as in step 7. **Press ENTER** key (5).
9. **Continue** entering number of balance weights on blade called for **until weights for all six blades are entered.**



CH-47 FIBERGLASS ROTOR BLADES
CONFIGURATION RECORD

AIRCRAFT S/N ____
AIRCRAFT MODEL ____
DATE ____

NOTE POSITION BLADES SO DOUBLE INTERRUPTER IS OVER MAGNETIC PICKUP

	BLADE RECORD	BLADE COLOR	TIP TARGET CONFIGURATION	BLADE S/N	TIP WT VIBREX
INITIAL CONFIGURATION	FWD TARGET				
	FWD A				
	FWD B				
	AFT TARGET				
	AFT A				
	AFT B				

POST FLIGHT CORRECTION

FWD BLADE	P/L	WT	P/L	WT	P/L	WT	P/L	WT	P/L	WT

GO TO NEXT PAGE

CH-47 PLL.TAB PROGRAM RECORD
(USE IN LIEU OF PRINTER)

SERIAL NO: ________________
DATE(DD/MM/YY): ________________
FLIGHT NO: ________________

EXISTING VIBREX TIP WEIGHTS INSTALLED ON BLADES:

weights ON FORWARD TARGET = ________ ☐
weights ON FORWARD -A- = ________ ☐
weights ON FORWARD -B- = ________ ☐
weights ON AFT TARGET = ________ ☐
weights ON AFT TARGET = ________ ☐
weights ON AFT -A- = ________ ☐
weights ON AFT -B- = ________ ☐

LATERAL VIBRATION VALUES (IPS AND CLOCK) FROM VIBREX:

FORWARD LATERAL ips = ________ ☐
FORWARD LATERAL clock = ________ ☐
AFT LATERAL ips = ________ ☐
AFT LATERAL clock = ________ ☐

PITCH LINK ADJUSTMENTS TO BE MADE:

FORWARD TARGET marks = ________ ☐
FORWARD -A-marks = ________ ☐
FORWARD -B-marks = ________ ☐
AFT TARGET marks = ________ ☐
AFT -A-marks = ________ ☐
AFT -B-marks = ________ ☐

VIBREX TIP WEIGHT ADJUSTMENTS FROM PROGRAM:

FORWARD TARGET weights ______ LEAVING ______ FORWARD TARGET weights
FORWARD -A- weights ______ LEAVING ______ FORWARD -A- weights
FORWARD -B- weights ______ LEAVING ______ FORWARD -B- weights
AFT TARGET weights ______ LEAVING ______ AFT TARGET weights
AFT -A- weights ______ LEAVING ______ AFT -A- weights
AFT -B- weights ______ LEAVING ______ AFT -B- weights

CAUTION:

After recording Vibrex tip weight adjustment, check the box [ ] to insure that input values correspond to those recorded above. Input values must correspond to insure correct program output.

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5-142.3 COMPUTER OPERATION (Continued) 5-142.3

10. When all balance weights have been entered, screen (2) will briefly show:

    ENTER IPS AND CLOCK ANGLE
    ENTER CLOCK AS FOLLOWS:
    HOURS (.5 FOR HALF HOURS)

    This display explains that vibration clock angle entries should be in half-hour increments, with .5 for the half hour. As an example, enter 12.5 for 12:30.

11. After the brief displays, screen (2) will show FWD LAT IPS=?. **Type in value of forward rotor lateral vibration.** Refer to FWD ROTOR LATERAL IPS entry on Track and Balance Worksheet (10).

12. **Press ENTER** key (5). Screen (2) will show FWD LAT CLOCK=? **Type in FWD ROTOR LATERAL CLOCK ANGLE** from worksheet (10). **Press ENTER** key.

13. **Repeat steps 11. and 12. for AFT ROTOR LATERAL IPS and AFT LAT CLOCK.**

14. When you have entered the aft lateral clock position into the computer, screen (2) will briefly show:

    INPUT LINK CHANGES:
    NUMBER OF MARKS
    (−) SHORTEN, (+) LENGTHEN

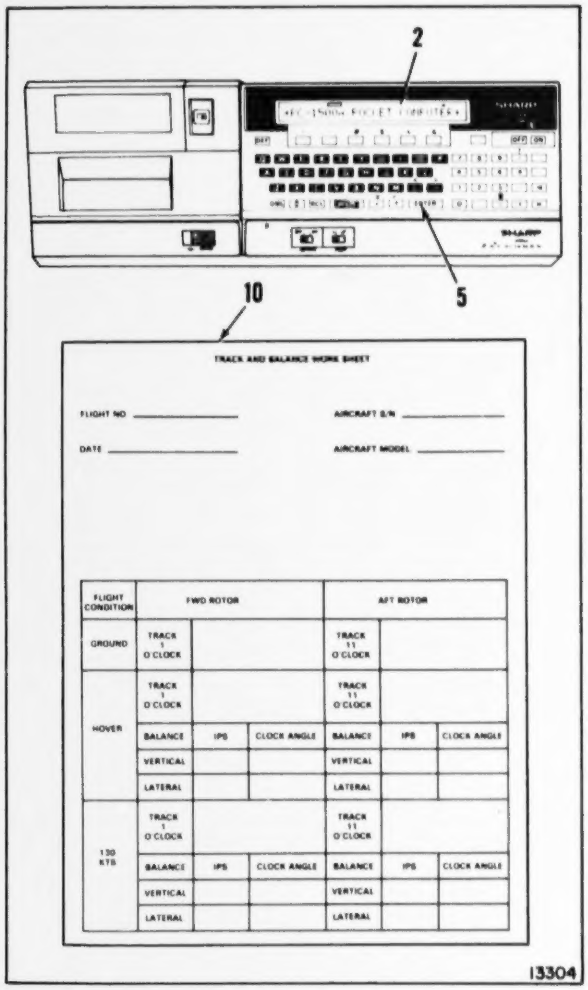
    This display explains that pitch link change entries must have a sign to indicate their effect on the link. If no sign is used, a + is assumed, so if a link is to be shortened, you must use a −.

15. Aft the brief displays, screen (2) will show FWD TARGET MARKS =? **Type in sign and amount of pitch link change needed for forward target blade.** Refer to P/L entry in POST FLIGHT CORRECTION box (11) of the Configuration Record. **Press ENTER** key (5).

    NOTE

    If no pitch link change is needed, just press ENTER key.

16. **Repeat step 11. for each of the remaining blades as it is displayed.**

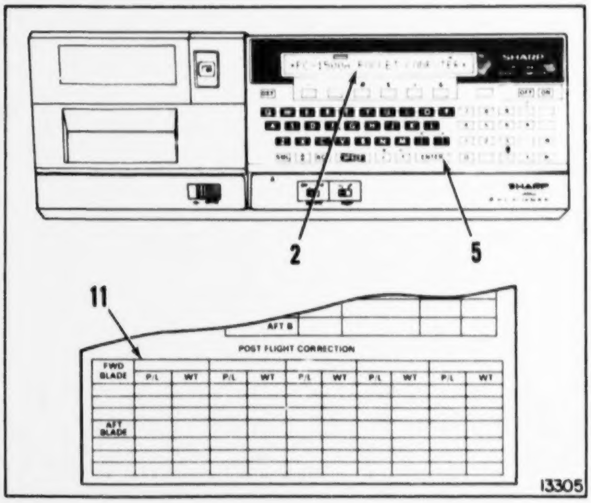


TRACK AND BALANCE WORK SHEET

FLIGHT NO ______ AIRCRAFT S/N ______

DATE ______ AIRCRAFT MODEL ______

FLIGHT CONDITION	FWD ROTOR			AFT ROTOR		
GROUND	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
HOVER	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE	BALANCE	IPS	CLOCK ANGLE
	VERTICAL			VERTICAL		
	LATERAL			LATERAL		
130 KTS	TRACK 1 O'CLOCK			TRACK 11 O'CLOCK		
	BALANCE	IPS	CLOCK ANGLE	BALANCE	IPS	CLOCK ANGLE
	VERTICAL			VERTICAL		
	LATERAL			LATERAL		



POST FLIGHT CORRECTION

FWD BLADE	P/L	WT	P/L	WT	P/L	WT	P/L	WT	P/L	WT
AFT BLADE										

GO TO NEXT PAGE

5-142.3 COMPUTER OPERATION (Continued) 5-142.3

17. If printer (3) is attached to computer (4), it will automatically produce a tape (12) listing required tip weight adjustments, new tip weight configuration, and all input data.

18. If printout (12) calls for adding so many tip weights on one blade that the total number will exceed ten, the printout paper will also display the following:

    > 10 WTS MAX <
    > PER BLADE <

    > CONSULT MAINT <
    > MANUAL FOR <
    > DISPOSITION <

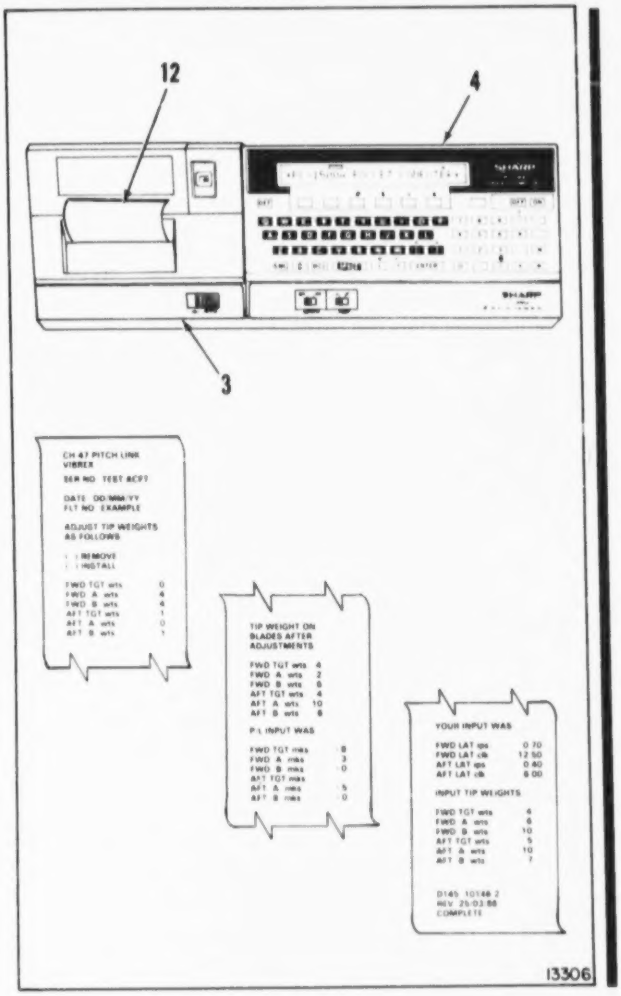
    If this happens, do one of the following:

    a. If no more than 12 weights are called for, make a trial run with ten weights. That may be enough for satisfactory smoothness.

    b. Switch blades to mount the problem blade nearest tc the swashplate drive arms (Tasks 5-64 and 5-84). This position reduces the need for tip weights.

    c. Troubleshoot the rotor system (TM 55-1520-240-T).

    d. Replace all three blades on the problem rotor head (Tasks 5-64 and 5-84).



```
CH 47 PITCH LINK
VIBREX

SER NO  TEST ACFT

DATE  DD/MM/YY
FLT NO  EXAMPLE

ADJUST TIP WEIGHTS
AS FOLLOWS

( ) REMOVE
( ) INSTALL

FWD TGT wts        0
FWD  A  wts        4
FWD  B  wts        4
AFT TGT wts        1
AFT  A  wts        0
AFT  B  wts        1
```

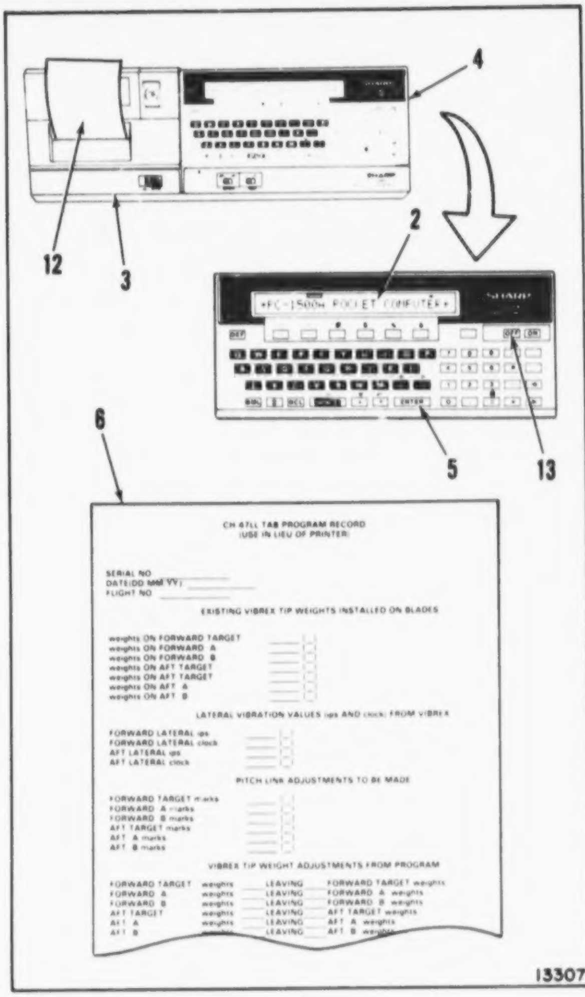
```
TIP WEIGHT ON
BLADES AFTER
ADJUSTMENTS

FWD TGT wts   4
FWD  A  wts   2
FWD  B  wts   6
AFT TGT wts   4
AFT  A  wts  10
AFT  B  wts   6

P/L INPUT WAS

FWD TGT mils      .8
FWD  A  mils      .3
FWD  B  mils      .0
AFT TGT mils
AFT  A  mils      .5
AFT  B  mils      .0
```

```
YOUR INPUT WAS

FWD LAT ips       0.70
FWD LAT clk      12.50
AFT LAT ips       0.40
AFT LAT clk       6.00

INPUT TIP WEIGHTS

FWD TGT wts        4
FWD  A  wts        6
FWD  B  wts       10
AFT TGT wts        5
AFT  A  wts       10
AFT  B  wts        7


D145  10148 2
REV  25/03/88
COMPLETE
```

GO TO NEXT PAGE

5-142.3 COMPUTER OPERATION (Continued) 5-142.3

19. **If printer (3) is not attached** to computer (4), screen (2) will show input, needed tip weight adjustments, and the new tip weight configuration for each blade. **Press ENTER key (5) to display data one line at a time.**
20. Check each value against input data recorded on Program Record (6). If figures match, place a check mark in the accompanying box. If any of the figures do not match, run the program over.
21. When all data have been presented, the word COMPLETE will appear on printout paper (12) or screen (2). If printer (3) is attached to computer (4), the screen will show ANOTHER PRINTOUT (Y OR N)? **If you want another copy, press Y and ENTER** key (5).
22. **Press OFF** key (13).



CH-47D TAB PROGRAM RECORD
(USE IN LIEU OF PRINTER)

SERIAL NO ____________
DATE(DD MM YY) ____________
FLIGHT NO ____________

EXISTING VIBREX TIP WEIGHTS INSTALLED ON BLADES

weights ON FORWARD TARGET ______ ☐
weights ON FORWARD A ______ ☐
weights ON FORWARD B ______ ☐
weights ON AFT TARGET ______ ☐
weights ON AFT TARGET ______ ☐
weights ON AFT A ______ ☐
weights ON AFT B ______ ☐

LATERAL VIBRATION VALUES ips AND clock FROM VIBREX

FORWARD LATERAL ips ______ ☐
FORWARD LATERAL clock ______ ☐
AFT LATERAL ips ______ ☐
AFT LATERAL clock ______ ☐

PITCH LINK ADJUSTMENTS TO BE MADE

FORWARD TARGET marks ______ ☐
FORWARD A marks ______ ☐
FORWARD B marks ______ ☐
AFT TARGET marks ______ ☐
AFT A marks ______ ☐
AFT B marks ______ ☐

VIBREX TIP WEIGHT ADJUSTMENTS FROM PROGRAM

FORWARD TARGET weights ______ LEAVING ______ FORWARD TARGET weights
FORWARD A weights ______ LEAVING ______ FORWARD A weights
FORWARD B weights ______ LEAVING ______ FORWARD B weights
AFT TARGET weights ______ LEAVING ______ AFT TARGET weights
AFT A weights ______ LEAVING ______ AFT A weights
AFT B weights ______ LEAVING ______ AFT B weights

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-142.4 ANALYZE COMPUTER ERROR MESSAGES 5-142.4

INITIAL SETUP

Applicable Configurations:
All

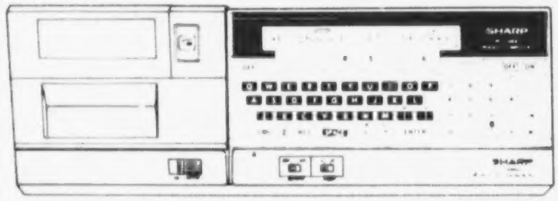
Tools:
None

Materials:
None

Personnel Required:
Medium Helicopter Repairer

References:
Task 5-142.7
Task 5-142.10

Equipment Condition:
Off Helicopter Task


13308

NOTE

The following steps refer to operation in which the computer is attached to the printer.

1. If one of the following error messages appears on screen (1), clear it as noted:

   a. CHECK 6: If this appears after ON key (2) is pressed, **charge printer batteries.** Refer to computer operating instructions.

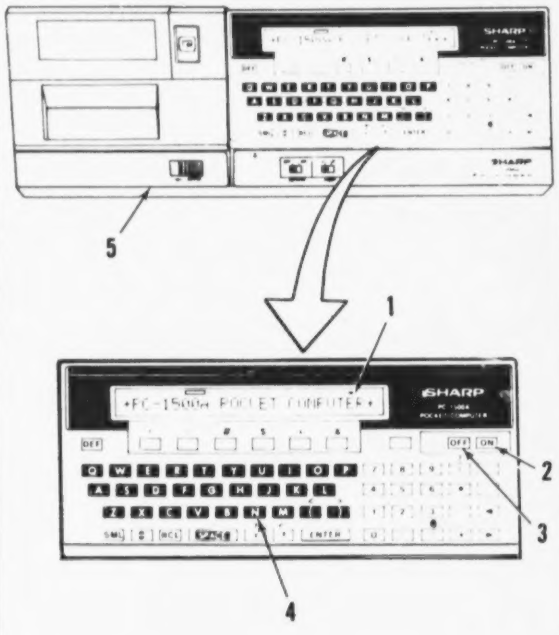
   b. ERROR 80 or ERROR 78: If one of these appears during program operation, **charge printer batteries.** If necessary, you can continue running the program without the printer by doing the following:

      (1) Press ON key (2) to stop program.

      (2) Press OFF key (3), then ON key (2). Program will continue.

      (3) When screen (1) reads PRINTER ATTACHED (Y or N)?, press N key (4). Program will continue as if printer (5) were not attached.

      (4) Charge printer batteries as soon as possible.



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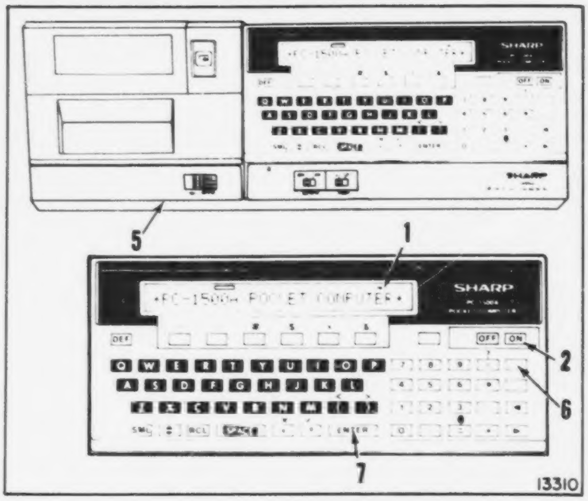
5-142.4 ANALYZE COMPUTER ERROR MESSAGES (Continued) 5-142.4



   c. ERROR 78: If this appears when ON key (2) is pressed, **printer** (5) **has not been removed from pen replacement mode** (Task 5-142.10).

   d. ERROR 27: If this appears after you respond to the query PRINTER ATTACHED (Y OR N)?, it means that **you pressed Y, but printer (5) was not attached.** Attach printer (Task 5-142.7).

2. Clear a CHECK OR ERROR display from screen (1) as follows:

   a. Press ON key (2).

   b. Press CL key (6). Screen (1) will clear. RUN will appear at top of screen and > will appear at left of screen.

   c. Type RUN and press ENTER key (7).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-142.5 MAINTAIN TRACKING/BALANCING COMPUTER AND ACCESSORIES 5-142.5

INITIAL SETUP

Applicable Configurations:
All

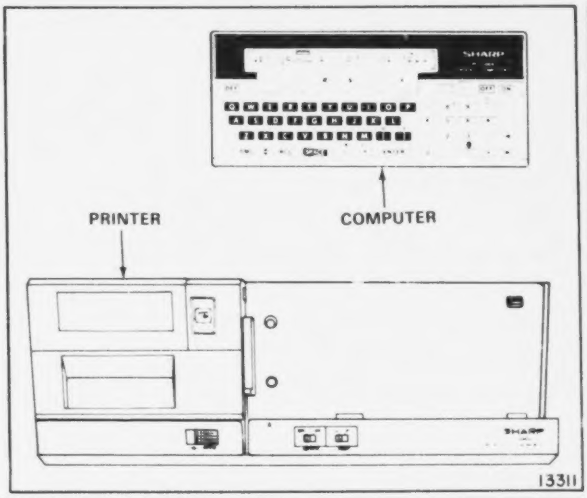
Tools:
None

Materials:
Cloth (E120)

Personnel Required:
Medium Helicopter Repairer

References:
Task 5-142.9

Equipment Condition:
Off Helicopter Task



NOTE

Observe the following general maintenance practices when handling the tracking/balancing computer and accessories.

1. **Do not expose the computer or its accessories to extreme temperatures or temperature changes** to dust, or to moisture. Clean only with a soft, dry cloth (E120). Do not use solvents or water.
2. **Keep the computer in its case as much as possible.** Exposure to radio frequency or electromagnetic radiation could damage the computer or program. The case provides some protection against such radiation.
3. **Do not store the magnetic accelerometers close to the computer.** When removed, store them in the top of the storage case, away from the computer.
4. **If the computer is dropped or suffers other impact, the internally-stored program may be affected.** If this happens, the computer must be reprogrammed. Refer to computer operating instructions.
5. **If the computer will not be used for over six months, remove the batteries.** (Task 5-142.9).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-142.6 REMOVE COMPUTER FROM PRINTER 5-142.6

INITIAL SETUP

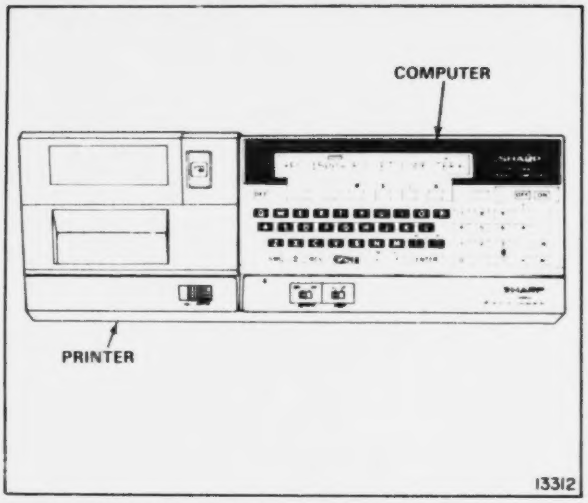
Applicable Configurations:
All

Tools:
None

Materials:
None

Personnel Required:
Medium Helicopter Repairer

Equipment Condition:
Off Helicopter Task



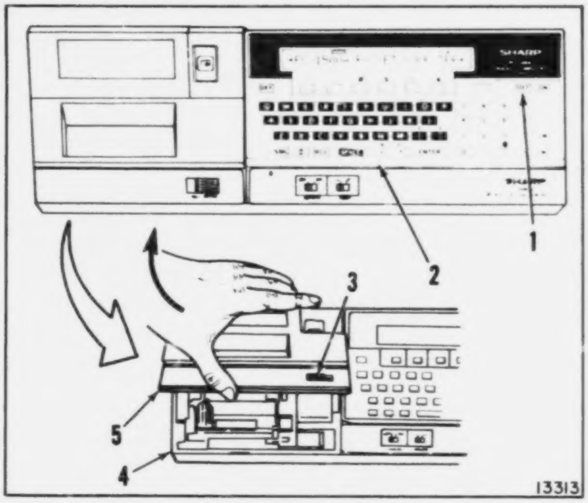
CAUTION

If power is not off, the computers internal program may be lost.

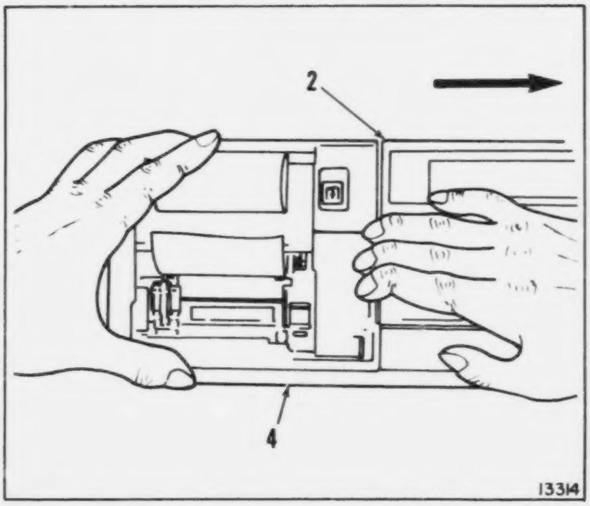
1. **Press OFF** key (1) on computer (2) to make sure power is off.
2. **Move OPEN switch (3)** at bottom edge of printer (4) **left. Lift cover (5)** from printer.

NOTE

Removing the cover allows a better grip to remove the computer.



3. Hold printer (4). Gently **slide computer (2) up and away from printer.**



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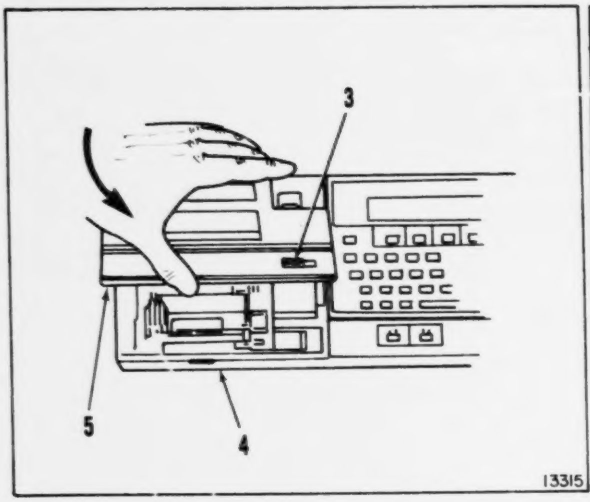
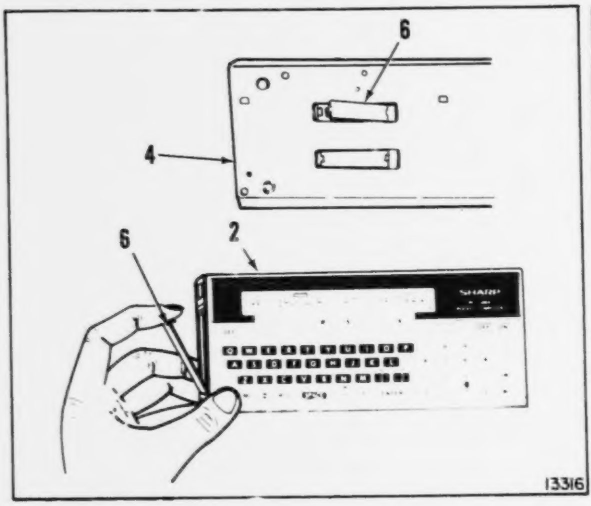
5-142.6 REMOVE COMPUTER FROM PRINTER (Continued) 5-142.6

4. **Install cover (5)** on printer (4). **Lock it** by moving OPEN switch (3) to the right.

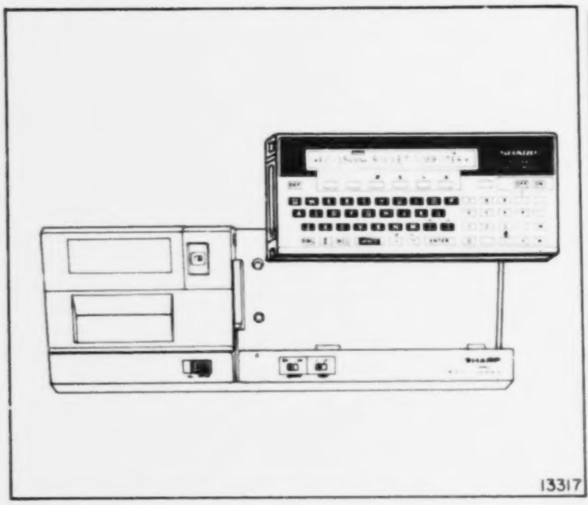


5. **Remove connector cover** (6) from back of printer (4). **Install cover over connector opening** at left side of computer (2).



FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-142.7 ATTACH COMPUTER TO PRINTER 5-142.7

INITIAL SETUP

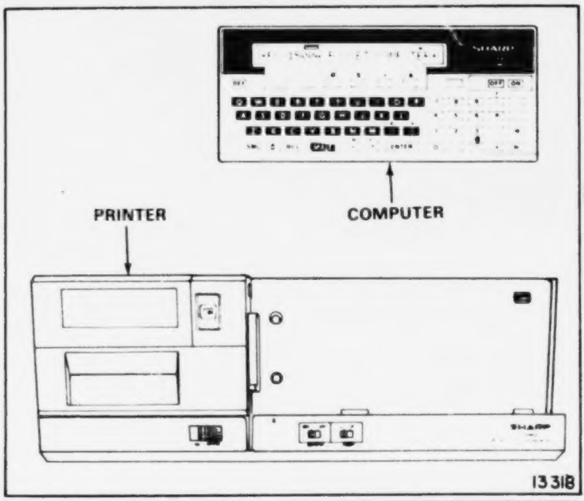
Applicable Configurations:
All

Tools:
None

Materials:
None

Personnel Required:
Medium Helicopter Repairer

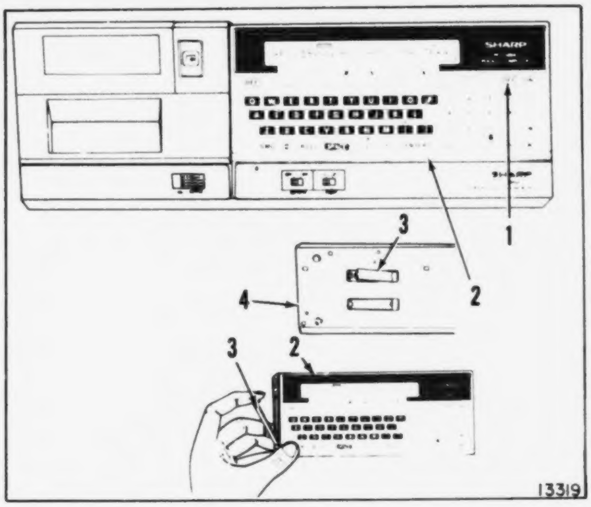
Equipment Condition:
Off Helicopter Task



CAUTION

If power is not off, the computer's internal program may be lost.

1. **Press OFF** key (1) on computer (2) to make sure power is off.
2. **Remove protective cover (3)** from left side of computer (2). Use your fingernail. **Snap cover onto bottom of printer (4).**

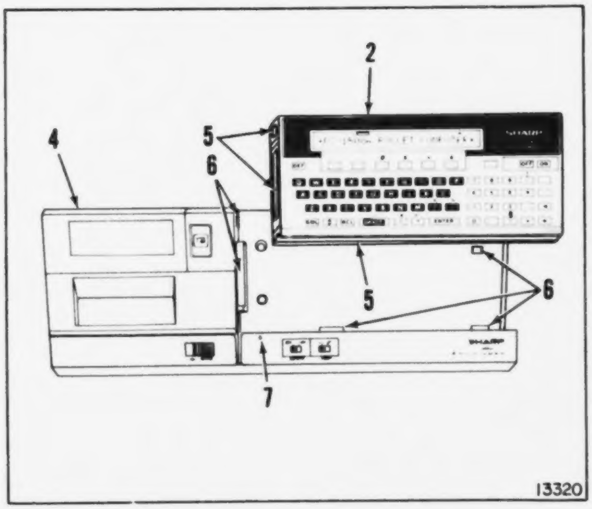


3. **Lay computer (2) into cradle of printer (4) so that slots (5) line up** with connectors (6). **Align left edge of computer with ▲ mark (7)** on lower edge of printer.

NOTE

If computer and printer do not fit together easily, do not force them. Reposition computer and try again.

4. Gently **push computer (2) left and down** so that connectors (6) snap into slots (5).

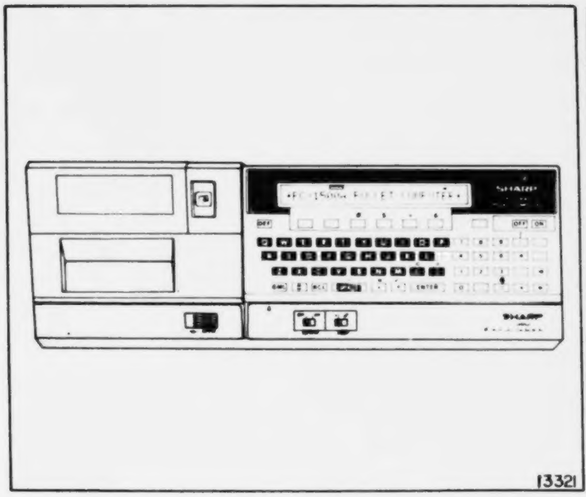


GO TO NEXT PAGE

5-142.7 ATTACH COMPUTER TO PRINTER (Continued) 5-142.7

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-142.8 REPLACE PRINTER PAPER 5-142.8

INITIAL SETUP

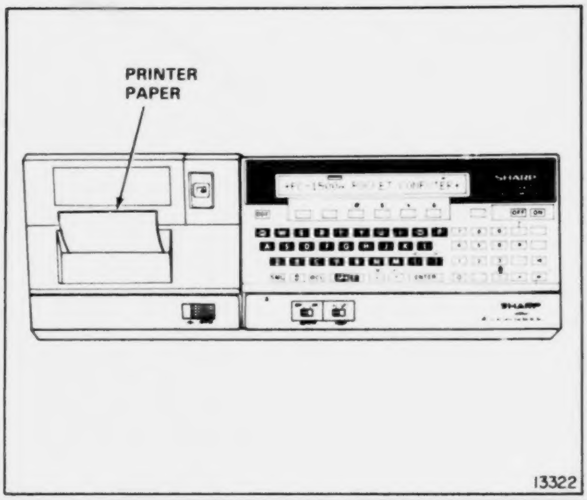
Applicable Configurations:
All

Tools:
None

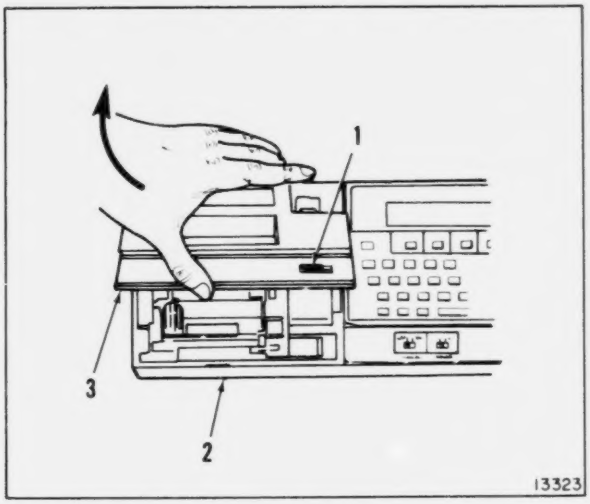
Materials:
Printer Paper (E262.1)

Personnel Required:
Medium Helicopter Repairer

Equipment Condition:
Off Helicopter Task


PRINTER PAPER
SHARP
OFF
ON
SHARP
13322

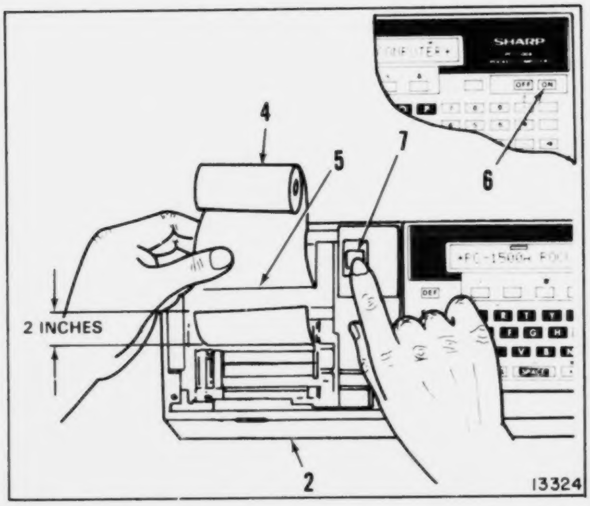
1. **Move OPEN switch (1)** at bottom edge of printer (2) to the **left. Lift cover (3)** from printer.



NOTE

If edge of paper roll is not straight and smooth, it may prevent paper insertion.

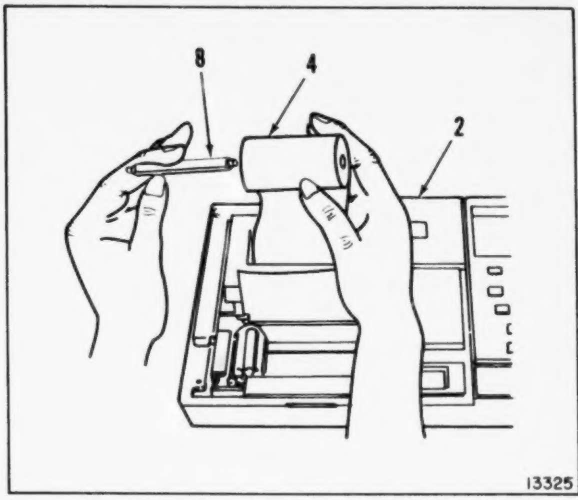
2. **Cut end of paper roll (E262.1) (4)** straight across. **Insert it** into paper inlet (5).
3. **Press computer ON key (6) and feed button (7). Feed paper (4)** into paper inlet (5) until it protrudes about 2 inches from printer (2).


SHARP
OFF
ON
4
5
7
6
2 INCHES
2
13324

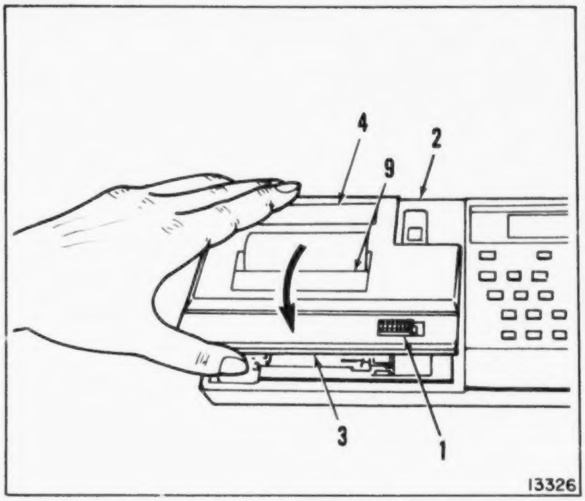
GO TO NEXT PAGE

5-142.8 REPLACE PRINTER PAPER (Continued) 5-142.8

4. Remove shaft (8) from printer (2). **Insert shaft in paper roll (4). Install shaft and roll in printer.**

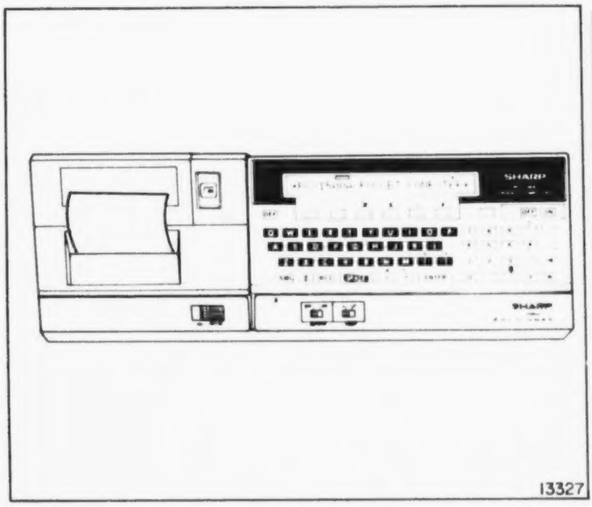


5. **Install cover (3)** on printer (2). **Thread** end of **paper roll (4)** out of cover and **through paper cutter (9).**
6. **Lock cover (3)** by moving OPEN switch (1) right.


4
2
9
3
1
13326

FOLLOW-ON MAINTENANCE:

None


SHARP
SHARP
13327

END OF TASK

5-142.9 REPLACE COMPUTER BATTERIES 5-142.9

INITIAL SETUP

Applicable Configurations:

All

Tools:

None

Materials:

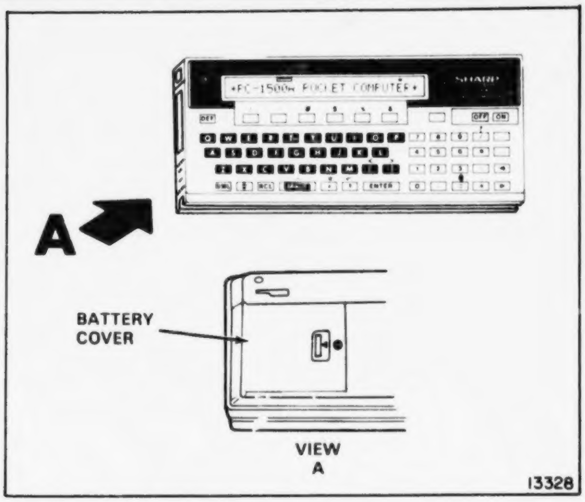
Batteries (E81.1)

Personnel Required:

Medium Helicopter Repairer

Equipment Condition:

Off Helicopter Task



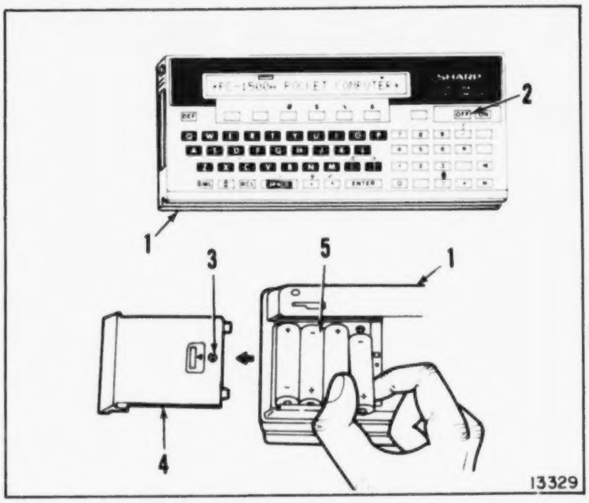
NOTE

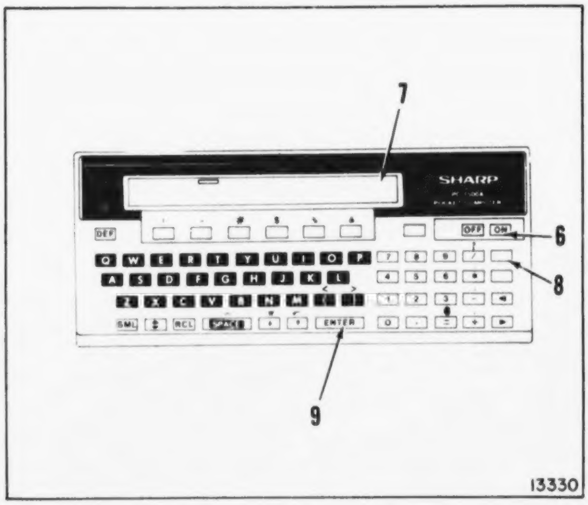
Always replace all four batteries at the same time. Do not mix new and used batteries.

1. Check that power to computer (1) is off. **Press POWER OFF** key (2).
2. **Loosen screw (3)** on battery cover (4) on the bottom of computer (1). Use a coin or non-magnetic screwdriver. **Slide cover away** from computer.
3. Remove old batteries (5). Install new ones (E81.1). **Be sure to observe correct polarity** (+ or −) direction.
4. **Slide cover (4) in position** on computer (1). **Tighten screw (3).**
5. **Press ON** key (6). **Check that screen (7) reads PRINTER ATTACHED (Y OR N)?** If it does not, press ON key again. Then press CL key (8). Type in R U N and press ENTER key (9).

FOLLOW-ON MAINTENANCE:

None





END OF TASK

5-142.10 REPLACE PRINTER PENS 5-142.10

INITIAL SETUP

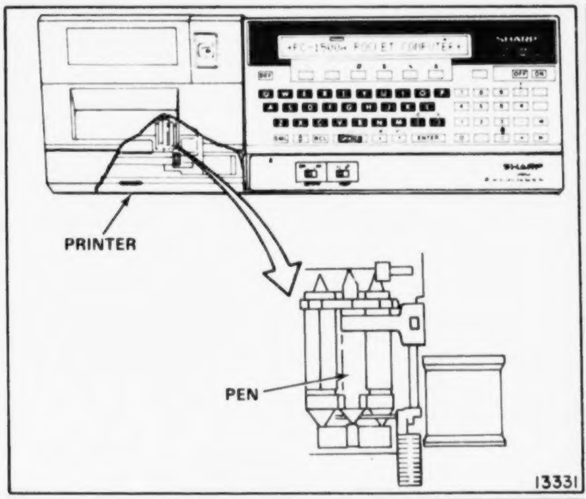
Applicable Configurations:
All

Tools:
None

Materials:
Printer Pen (E271.1)

Personnel Required:
Medium Helicopter Repairer

Equipment Condition:
Off Helicopter Task



NOTE

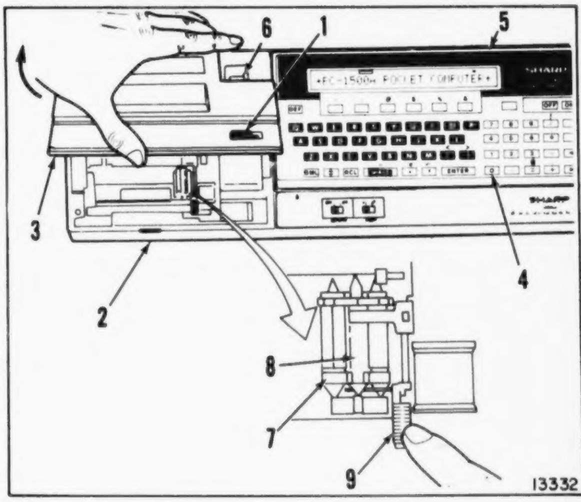
Replace any one of the four colored pens in the same way.

1. **Move OPEN switch (1)** at bottom edge of printer (2) **left. Lift cover (3)** from printer.
2. **Press and hold 0 key (4)** on computer (5). At the same time, **press feed key** (6) on printer (2). When pen holder (7) starts to move, release feed key.
3. **Press and release feed key (6)** as in step 2. **until pen (8) to be replaced rotates to top** of holder (7). **Release 0 key (4).**
4. **Press pen removal lever (9).** Pen (8) at top of holder will be released.

NOTE

Hold pen securely when removing it so it does not fall into printer.

5. **Remove pen (8). Snap replacement pen (E271.1) into position.**



GO TO NEXT PAGE

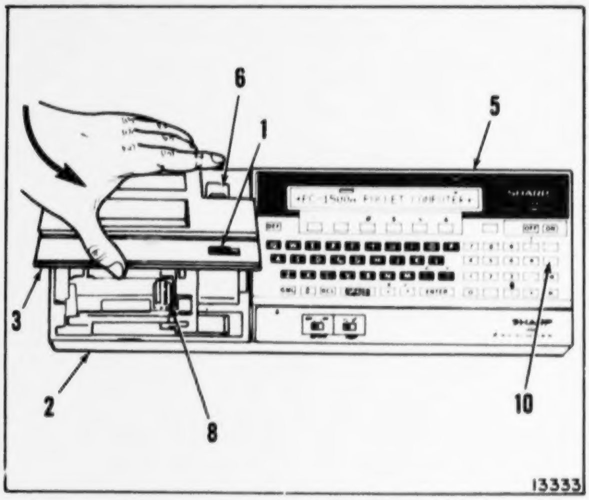
5-142.10 REPLACE PRINTER PENS (Continued) 5-142.10

6. Repeat steps 2. thru 5. until all required pens (8) have been replaced.
7. When required pens have been replaced, **press CL key (10)** on computer (5) **and feed key (6)** on printer (2).

NOTE

Leving pens uncapped may allow ink to dry out. Remove and cap all pens if computer will not be used for more than two weeks.

8. **Install caps** on removed pens.
9. **Install cover (3)** on printer (2). Lock it by moving OPEN switch (1) to the right.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-143 REMOVE TRACKING AND BALANCING EQUIPMENT 5-143

INITIAL SETUP

Applicable Configurations:
All

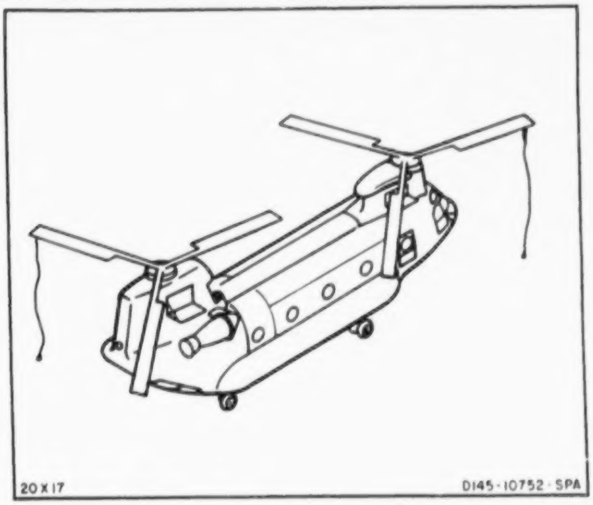
Tools:
Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
Torque Wrench, 100 to 750 Inch-Pounds

Materials:
Lockwire (E233)

Personnel Required:
67U10 Medium Helicopter Repairer
67U20 Medium Helicopter Repairer

References:
Task 1-26

Equipment Condition:
Battery Disconnected (Task 1-39)
Electrical Power Off
Hydraulic Power Off
One Forward and One Aft Rotary-Wing Blade Tied-Down (Task 1-26)
Forward and Aft Pylon Work Platform Open (Task 2-2)



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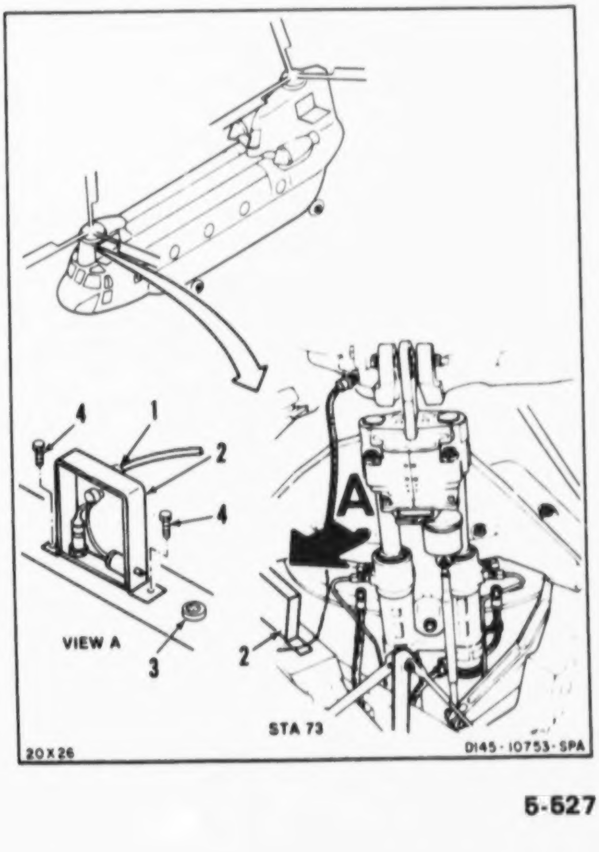
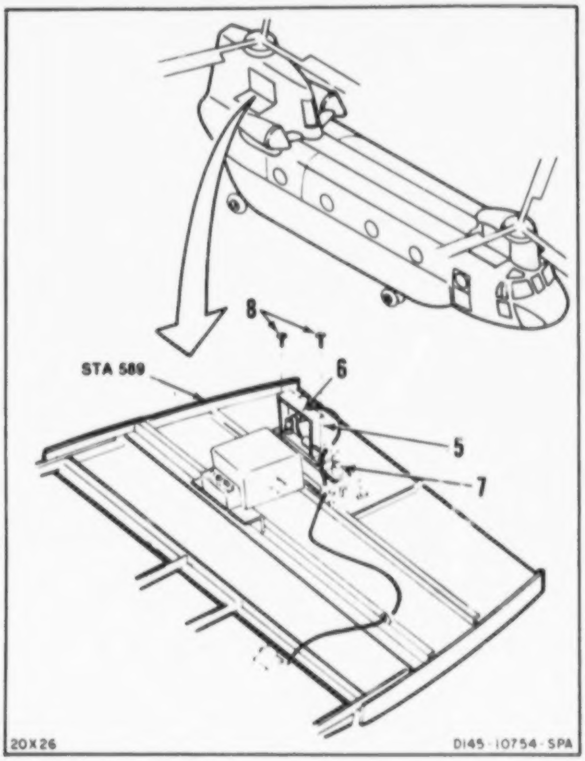
1. **Disconnect plug (1) from forward accelerometer block (2). Install plug on dummy connector (3). Remove two screws (4). Remove accelerometer block.**



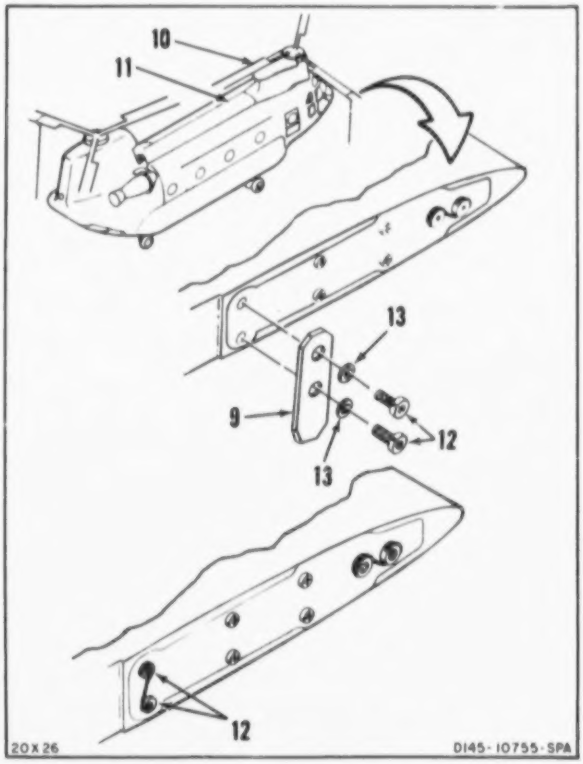
GO TO NEXT PAGE

5-143 REMOVE TRACKING AND BALANCING EQUIPMENT (Continued) 5-143

2. **Disconnect plug (5) from aft accelerometer block (6).** Install plug on dummy connector (7). Remove two screws (8). **Remove accelerometer block.**


8
STA 589
6
5
7
20X26
D145-10754-SPA

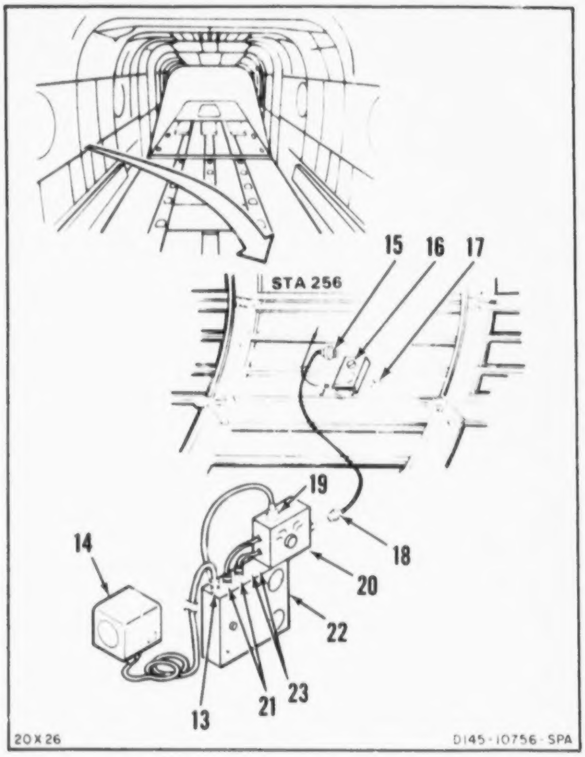
3. **Remove six targets (9)** as follows:
   a. Untie blades (10). Position one blade over tunnel (11).
   b. Remove lockwire from two screws (12). Remove screws, washers (13), and target (9).
   c. Install washers (13) and screws (12). **Torque screws to 175 inch-pounds.**
   d. Lockwire screws (12). Use lockwire (E233).
   e. Repeat steps a through d for other five blades (10).
   f. Tie down one forward and one aft blade (Task 1-26).


10
11
13
9
12
13
12
20X26
D145-10755-SPA

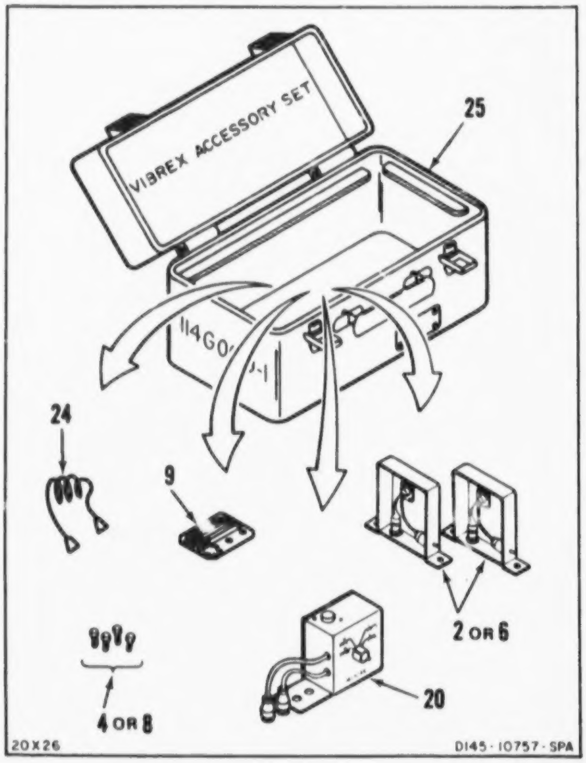
GO TO NEXT PAGE

5-143 REMOVE TRACKING AND BALANCING EQUIPMENT (Continued) 5-143

4. Disconnect plug (13) to **disconnect tracker (14).**
5. Disconnect plug (15) from receptacle (16). Install dust cap (17).
6. Disconnect plugs (18 and 19) from rotary switch (20).
7. **Disconnect** two plugs (21) from **balancer (22).** Remove two connectors (23). **Remove rotary switch (20).**


STA 256
15
16
17
19
14
18
20
22
13
21
23
20X26
D145-10756-SPA

8. Replace cable , targets (9), accelerometer blocks (2 and 6), four screws (4 and 8), and rotary switch (20) in Vibrex accessory set (25).


VIBREX ACCESSORY SET
25
114G0
24
9
2 OR 6
4 OR 8
20
20X26
D145-10757-SPA

FOLLOW-ON MAINTENANCE:

Close work platforms (Task 2-2).

END OF TASK

5-144 PITCH LINK CORRECTIONS FOR AUTOROTATION % RPM 5-144

INITIAL SETUP

Applicable Configurations:
All

Tools:
None

Materials:
None

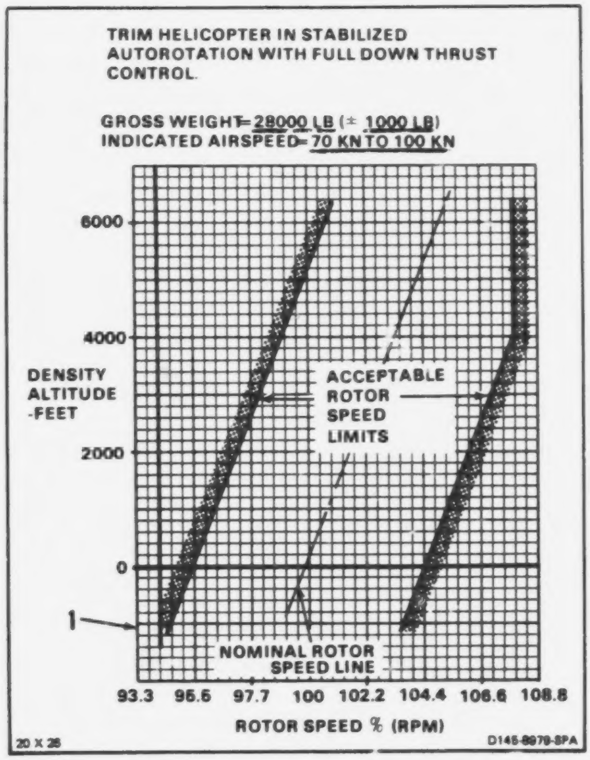
Personnel Required:
67U20 Medium Helicopter Repairer
100C0 Army Rotary-Wing Aviator (2)

References:
TM 55-1520-240-10
Task 5-94

Equipment Condition:
Helicopter in Level Flight (TM 55-1520-240-10)

---

1. **Have pilot perform autorotation. Have him read ROTOR % RPM while passing through selected density altitudes** (TM 55-1520-240-10).
2. **Record density altitude and % RPM on Autorotational RPM Chart (1).**
3. Have pilot land helicopter and stop engines (TM 55-1520-240-10).



GO TO NEXT PAGE

5-144 PITCH LINK CORRECTIONS FOR AUTOROTATION % RPM (Continued) 5-144

NOTE

% RPM on left side of acceptable range is low. % RPM on right side is high.

4. Enter chart (1) at density altitude (step 1). Follow line to % RPM. If % RPM is within limits, go to FOLLOW-ON MAINTENANCE.
5. If % RPM is not within limits, **figure pitch link adjustment** as follows:
   a. On chart (1), draw line parallel to nominal (desirable) rotor speed line from % RPM down to 0 density altitude line.
   b. Read % RPM at 0 density altitude line. If % RPM is low, subtract from 100 percent. If % RPM is high, subtract 100 percent from % RPM.

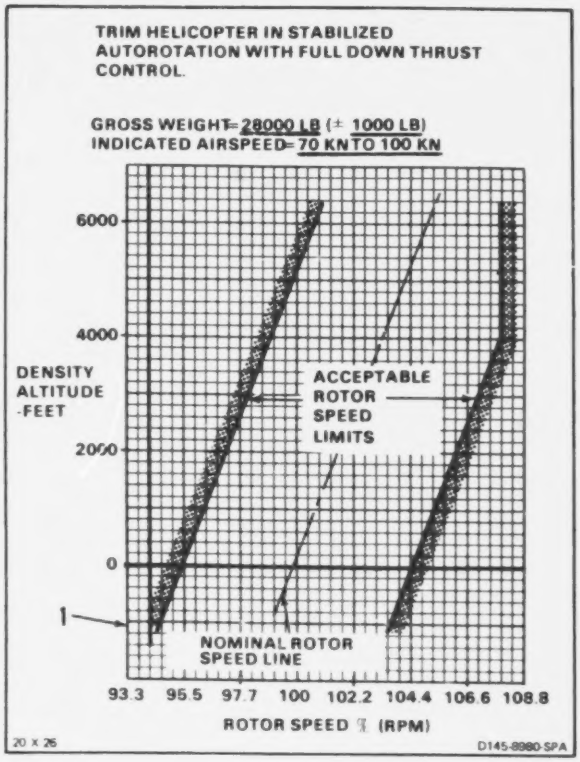
NOTE

Two-mark adjustment of pitch link turnbuckle changes % RPM by 1 percent. Adjustment of one complete turn (30 marks) changes % RPM by 6.5 percent.

   c. Note difference from 100 percent in step b. To reduce % RPM by 1 percent, turn pitch links two marks toward +. To increase % RPM by 1 percent, turn pitch links two marks toward –.
6. Adjust all six pitch links by equal amount as figured in step 5.c. Shorten links if % RPM is low. Lengthen links if % RPM is high (Task 5-94).

FOLLOW-ON MAINTENANCE:

None



END OF TASK

5-145 STROBEX/VIBREX FUNCTIONAL CHECK 5-145

INITIAL SETUP

Applicable Configurations:
All

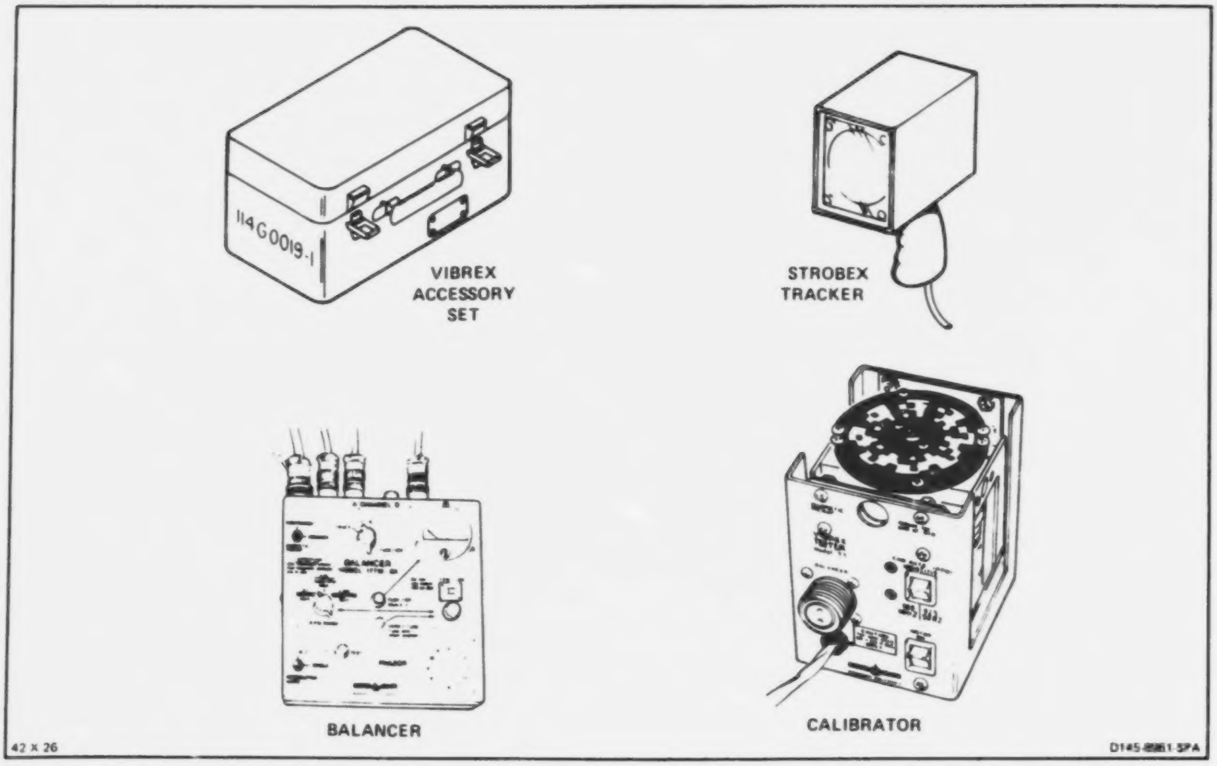
Tools:
- Aircraft Mechanic's Tool Kit, NSN 5180-00-323-4692
- Power Supply, 28 VDC
- Strobex/Vibrex Calibrator,.Model II
- Calibrator Cable 4875
- Balancer Model 177M-6A
- Strobex Lamp, Model 135M-11
- Vibrex Accessory Set, 114G0019-1
- Magnetic Pickup 3030AN

Materials:
None

Personnel Required:
- 67U20 Medium Helicopter Repairer
- 67U30 Inspector

References:
TM 55-4920-402-13 & P

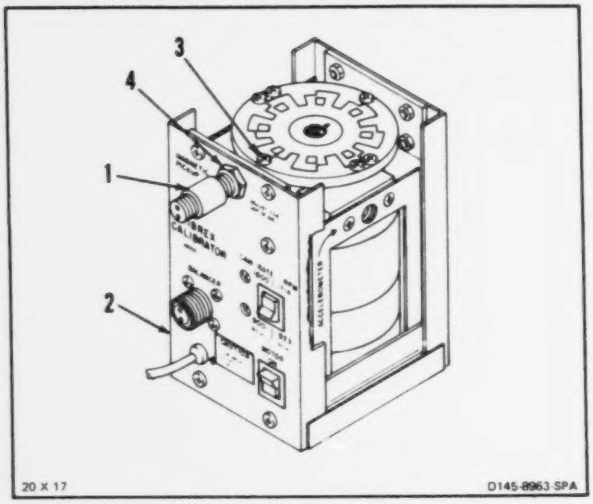
Equipment Condition:
Off Helicopter Task


114G0019-1
VIBREX ACCESSORY SET
STROBEX TRACKER
BALANCER
CALIBRATOR
42 X 26
D145-8881-SPA

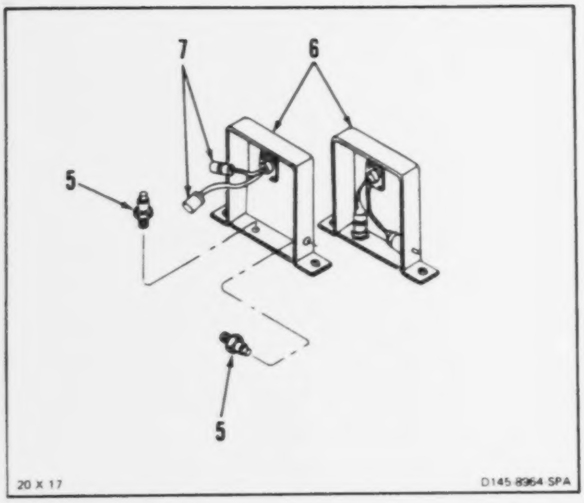
GO TO NEXT PAGE

5-145 STROBEX/VIBREX FUNCTIONAL CHECK (Continued) 5-145

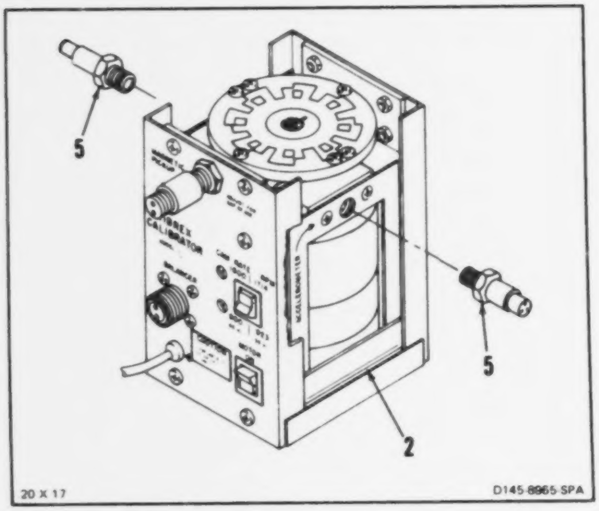
1. **Screw magnetic pickup detector (1) into calibrator (2)** until detector just touches one of six screws (3).
2. **Back-off detector 1/6-turn** or one flat of jam nut (4).
3. Hold pickup (1) and **tighten jam nut (4)**.


3
4
1
2
20 X 17
D145-8963-SPA

4. **Remove four accelerometers (5)** from accelerometer blocks (6) as follows:
   a. Remove connectors (7).
   b. Remove accelerometers (5).

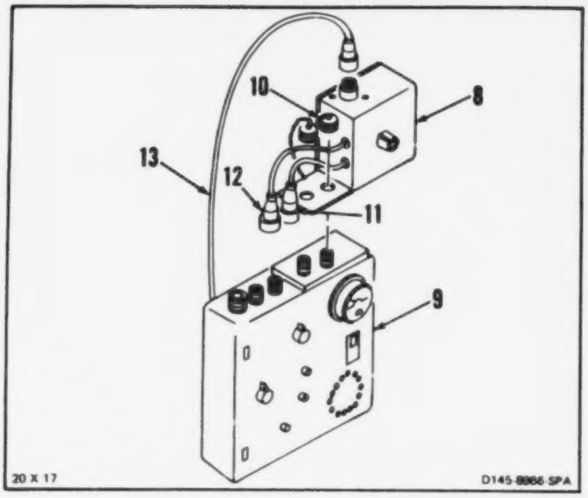

7
6
5
5
20 X 17
D145-8964-SPA

5. **Install two accelerometers (5) on calibrator (2).** Finger-tighten accelerometers.

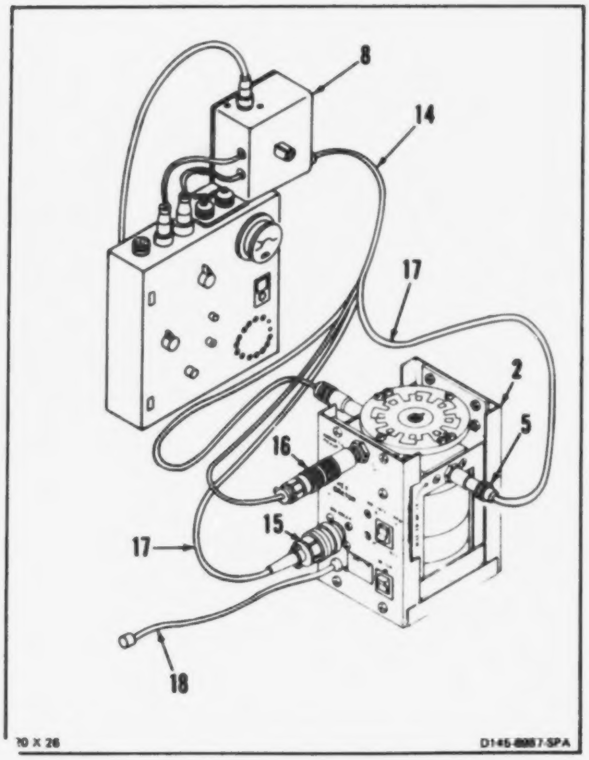

5
5
2
20 X 17
D145-8965-SPA

GO TO NEXT PAGE

5-145 STROBEX/VIBREX FUNCTIONAL CHECK (Continued) 5-145



6. **Install rotary switch (8) on balancer (9).** Use two screw caps (10).
7. Connect rotary switch (8) to balancer (9) as follows:
   a. Connect magnetic pickup cable (11) to balancer (9).
   b. Connect accelerator cable (12) to balancer (9).
   c. Connect power cable (13) to rotary switch (8).



8. **Connect calibrator (2) to rotary switch (8)** as follows:
   a. Connect cable 4875 (14) to rotary switch (8).
   b. Connect power cord connector (15) of cable (14) to calibrator (2).
   c. Connect magnetic pickup connector (16) of cable (14) to detector (1).
   d. Connect accelerometer cables (17) of cable (14) to accelerometers (5).

CAUTION

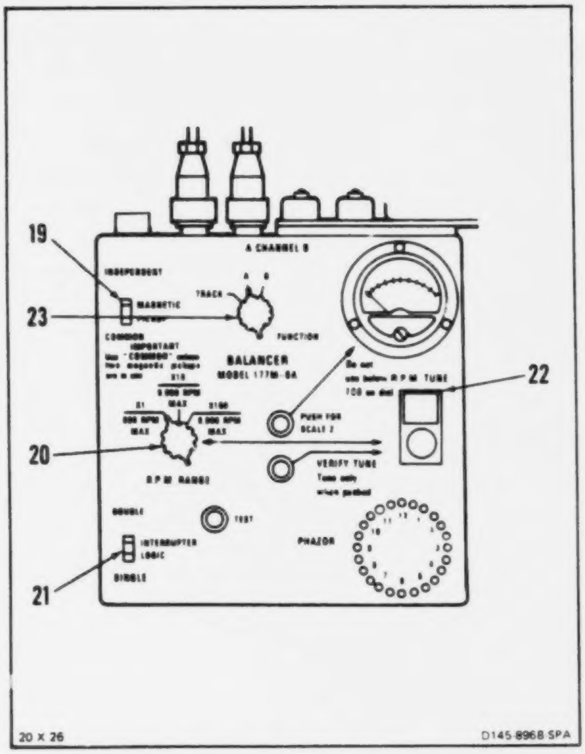
Do not operate calibrator on power source other than 28 vdc. Equipment can be damaged.

9. **Connect power cord (18)** from calibrator (4) to 28 vdc power supply. Apply power source.

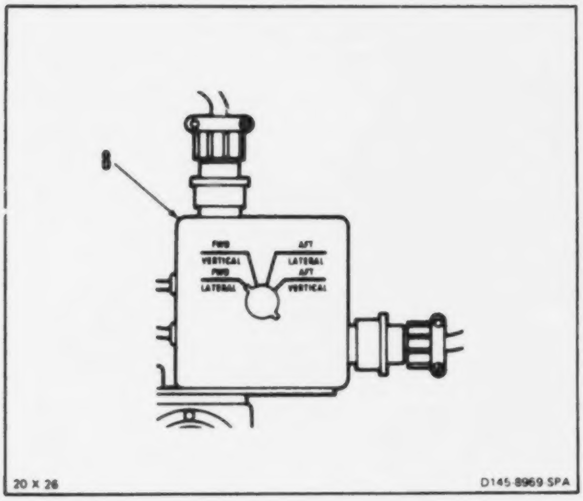
GO TO NEXT PAGE

5-145 STROBEX/VIBREX FUNCTIONAL CHECK (Continued) 5-145

10. **Set MAGNETIC PICKUP switch (19) to COMMON.**
11. **Set RPM RANGE selector (20) to X10.**
12. **Set INTERRUPTER LOGIC switch (21) to DOUBLE.**
13. **Set RPM TUNE control (22) to 180.**
14. **Set FUNCTION switch (23) to A.**


19
23
20
21
22
A CHANNEL B
INDEPENDENT
MAGNETIC PICKUP
COMMON
IMPORTANT
Use "COMMON" when two magnetic pickups are in use
TRACK
A
B
FUNCTION
BALANCER
MODEL 177M-6A
X1
X10
X100
MAX
PUSH FOR SCALE 2
Do not use below R P M TUNE 100 on dial
VERIFY TUNE
Tune only when pushed
R P M RANGE
DOUBLE
TEST
INTERRUPTER LOGIC
SINGLE
PHAZOR
20 X 26
D145-8968 SPA

15. **Set rotary switch (8) to FWD LATERAL.**


8
FWD VERTICAL
FWD LATERAL
AFT LATERAL
AFT VERTICAL
20 X 26
D145-8969 SPA

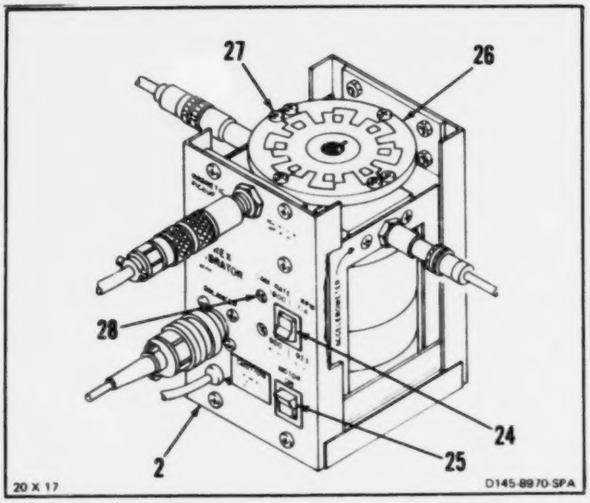
GO TO NEXT PAGE

16. **Set CAM RATE switch (24)** on calibrator (2) **to 1800/1744.**
17. **Set MOTOR switch (25) to ON.**
18. **Note outer ring (26)** of rotor disc (27) under ordinary fluorescent light. **Patterns should remain stationary.**

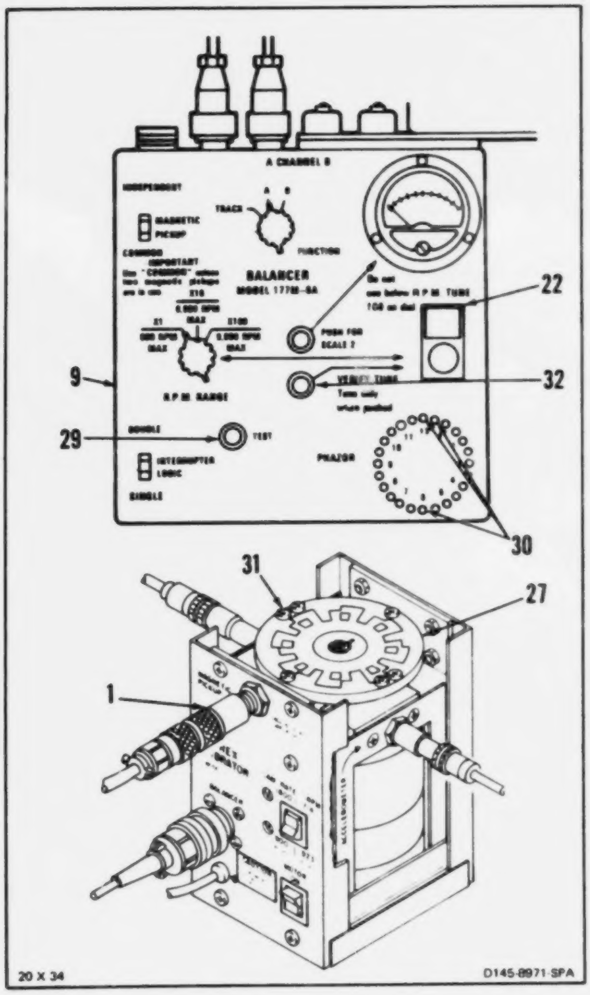
NOTE

If calibrator is tuned correctly, image may appear fuzzy or blurred, but should remain stationary.

19. **If outer ring (26) rotates, adjust trim potentiometer (28)** until outer ring image appears stopped.

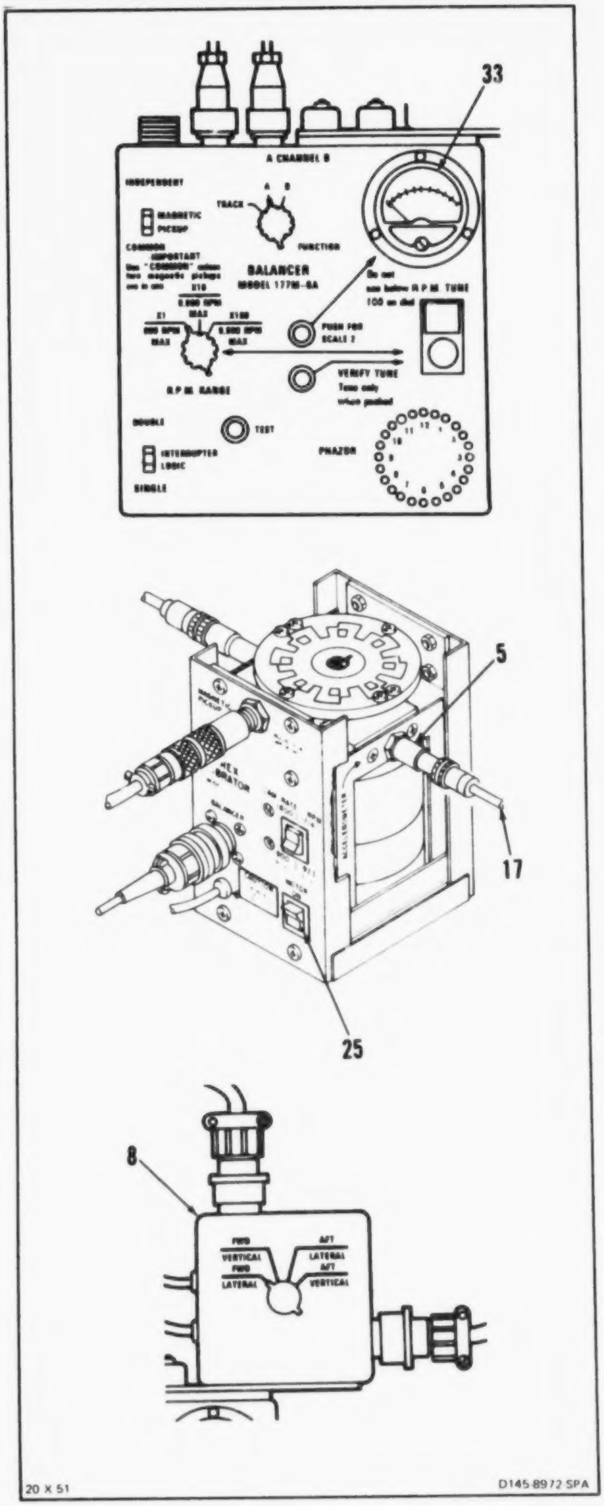


20. **Press and hold TEST switch (29). Check that PHAZOR lights (30) come on at 12, 1, and 6 o'clock positions.** Release TEST switch. If lights come on at 12, 12:30, and 6 o'clock positions, this is acceptable.
21. **If PHAZOR lights (30) do not come on** when TEST switch (29) is pressed, **check gap between screws (31) and detector (1)** (steps 2, 3, and 4). Gap between pickup detector and screws must be very close to pick up output signal.
22. **Check that all six screws (31) are installed on rotor (27).**
23. **Check clock angle of PHAZOR light (30) that remains on.**
24. **Press and hold verify tune switch (32). Check clock angle of PHAZOR light (30)** that is on. **Adjust RPM tune control (22)** to move light to same position as in step 23.
25. **Repeat steps 23 and 24 until light remains on at same position when** verify tune **switch (32) is pressed.** Clock angle should be 2:30 to 3:30.
26. **Check that RPM tune (22) indicates 176 to 184.** If RPM tune is not 176 to 184, check rotor speed. If rotor speed is not 1800 rpm, calibrate tunable filter network of balancer (9) (TM 55-4920-204-13 & P).



GO TO NEXT PAGE

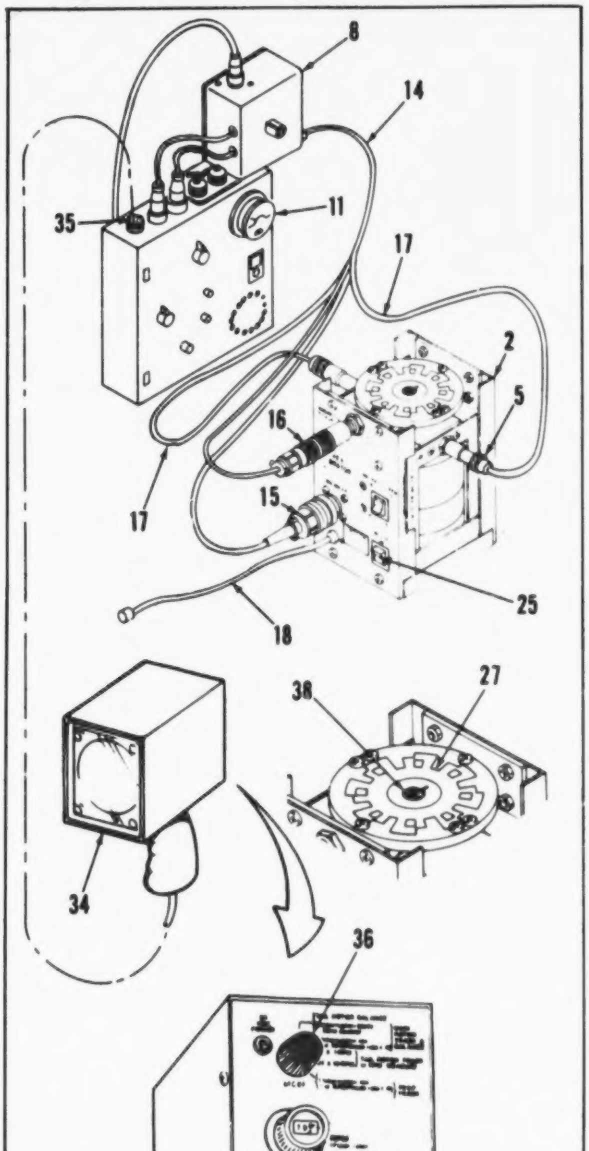
27. **Note reading on IPS indicator (33). Reading should be 0.72 to 0.88 IPS.**
28. **Set rotary switch (8) to FWD VERTICAL.**
29. **Note reading on IPS indicator (33). Reading should be 0.72 to 0.88 IPS.**
30. Accelerometers (5) are serviceable if IPS readings in steps 27 and 29 are within range.
31. If IPS reading in either of steps 27 or 29 is 0.0 IPS, **find defective accelerometer (5)** as follows:
    a. Disconnect one cable (17).
    b. Note IPS indicator reading while switching to FWD LATERAL.
    c. If IPS reading is same as in steps 27 and 29, replace disconnected accelerometer (5).
    d. If IPS reading is 0.0 IPS with rotary switch (8) set to FWD LATERAL or FWD VERTICAL, replace connected accelerometer (5).
32. **Disconnect two cables (17). Remove accelerometers (5).** Install remaining two accelerometers. Connect cables.
33. **Repeat step 31.**
34. **Set** calibrator motor **switch (25) to OFF.**


33
A CHANNEL B
TRACK
FUNCTION
BALANCER
TEST
PHAZOR
5
17
25
8
FWD VERTICAL
FWD LATERAL
AFT LATERAL
AFT VERTICAL
20 X 51
D145-8972 SPA

GO TO NEXT PAGE

5-145 STROBEX/VIBREX FUNCTIONAL CHECK (Continued) 5-145

35. **Check operation of Strobex tracker (34)** as follows:
    a. Connect Strobex tracker (34) to balancer receptacle (35).
    b. Set MODE switch (36), on lamp (34) to A.
    c. Set balancer function switch (23) to TRACK.
    d. Set calibrator MOTOR switch (25) to ON.
    e. Press and hold trigger (37). Aim tracker (34) at ch logo (38) on calibrator rotor (27).
    f. Check that stem of h in logo (38) appears stopped at 12, 3, 6 and 9 o'clock positions.
    g. Set balancer function switch (23) to A.
    h. Repeat step e. Stem of h should appear stopped at 1:30 and 7:30 o'clock positions.
36. **Set calibrator MOTOR switch (25) to OFF. Remove power source.**
37. **Disconnect cable (18) from power source.**
38. **Disconnect cables (15, 16, and 17) from calibrator (2).**
39. **Disconnect cable (14) from rotary switch (8).**
40. **Disconnect Strobex tracker (34) from receptacle (35).**



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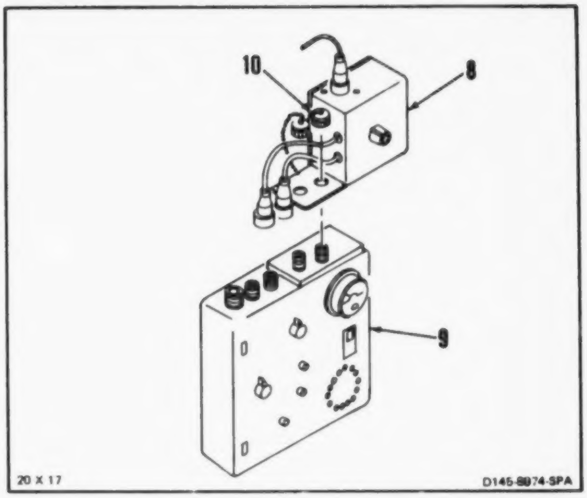
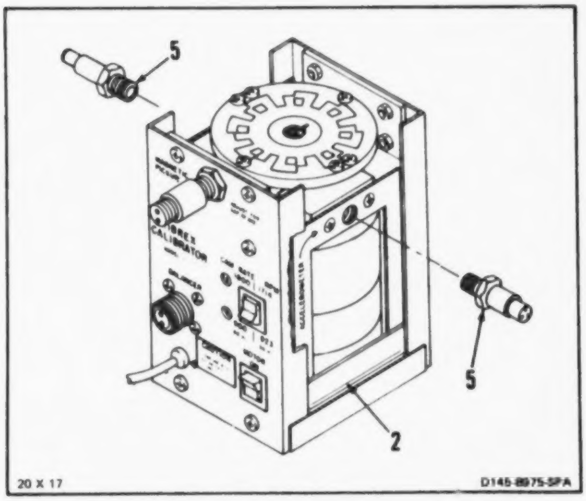
5-145 STROBEX/VIBREX FUNCTIONAL CHECK (Continued) 5-145

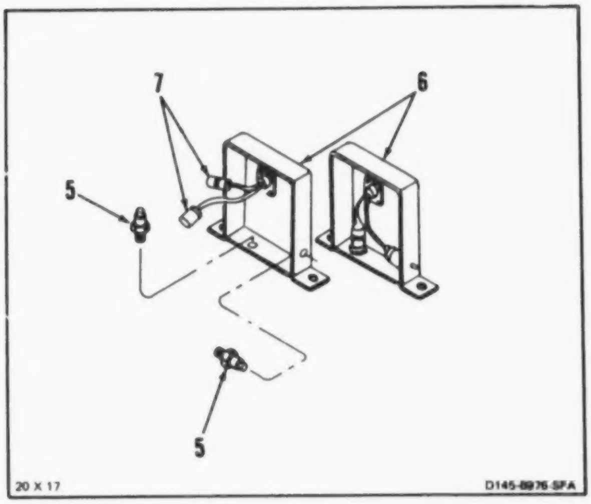
41. Remove two screw caps (10). **Remove rotary switch (8)** from balancer (9).


10
8
9
20 X 17
D145-8974-SPA

42. **Remove two accelerometers (5)** from calibrator (2).


5
5
2
VIBREX CALIBRATOR
BALANCER
MOTOR
ACCELEROMETER
20 X 17
D145-8975-SPA

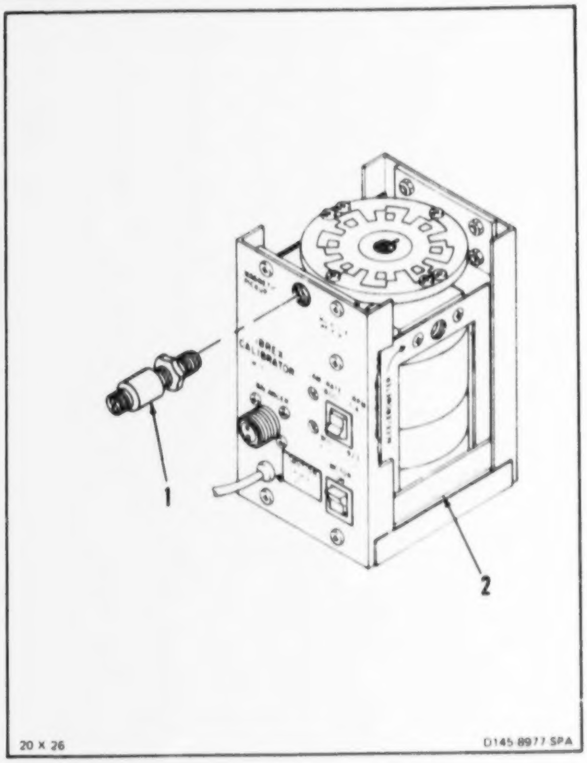
43. **Install four accelerometers (5)** in accelerometer blocks (6).
44. **Install connectors (7) on accelerometers (5).**


7
6
5
5
20 X 17
D145-8976-SPA

GO TO NEXT PAGE

5-145 STROBEX/VIBREX FUNCTIONAL CHECK (Continued) 5-145

45. **Remove magnetic pickup detector (1) from calibrator (2).**


VIBREX CALIBRATOR
1
2
20 X 26
D145-8977 SPA

FOLLOW-ON MAINTENANCE:

None

END OF TASK

Tasks 5-146, 5-147, and 5-148 Deleted.
Pages 5-541, 5-542, and 5-543 deleted.
Pages Index-1 thru Index-118 Deleted

5-146 CLEAN AND INSPECT STROBEX TRACKER (AVIM) 5-146

INITIAL SETUP

Applicable Configurations:
All

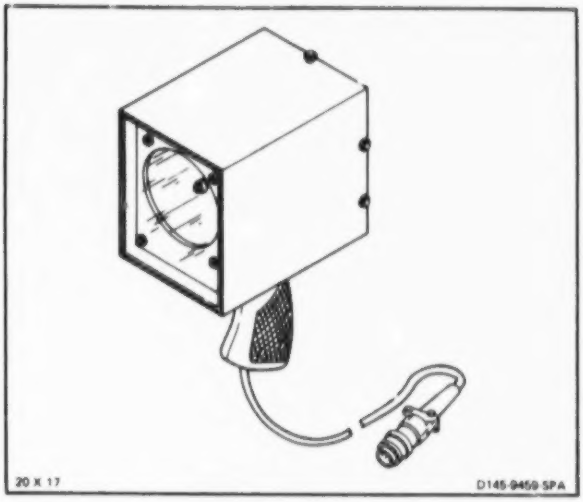
Tools:
TM 55-4920-402-13 & P

Materials:
TM 55-4920-402-13 & P

Personnel Required:
68F10 Aircraft Electrician
67U30 Inspector

References:
TM 55-4920-402-13 & P

Equipment Condition:
Off Helicopter Task



1. **Clean and inspect Strobex tracker** (TM 55-4920-402-13 & P).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-147 CLEAN STROBEX TRACKER 5-147

INITIAL SETUP

Applicable Configurations:
All

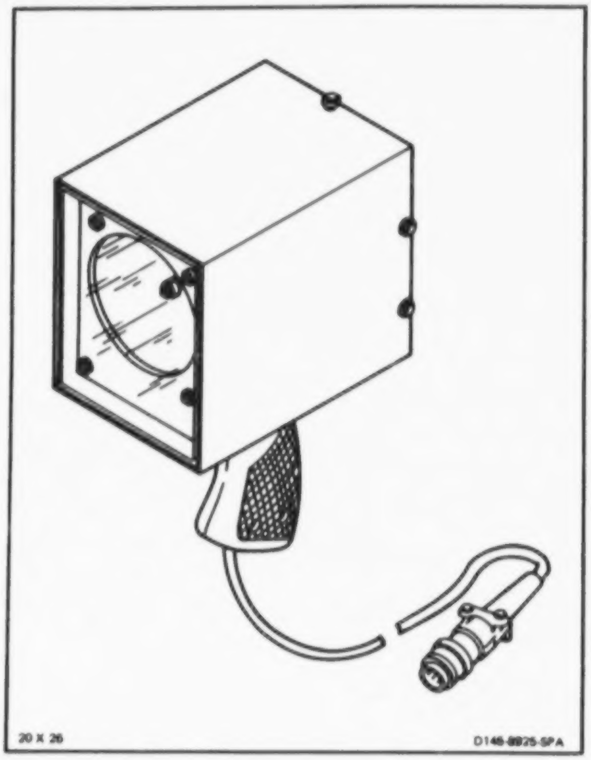
Tools:
Aircraft Mechanic's Tool Kit,
NSN 5180-00-323-4692

Materials:
Cloth (E120)
Gloves (E186)

Personnel Required:
68F10 Electrician

References:
TM 55-4920-402-13&P

Equipment Condition:
Off Helicopter Task



1. Clean Strobex tracker (TM 55-4920-402-13&P).

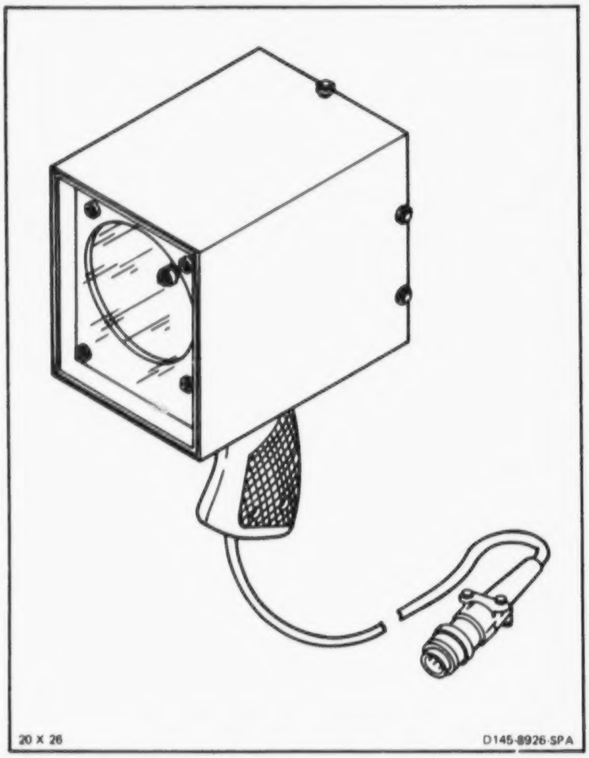
FOLLOW-ON MAINTENANCE:

None

END OF TASK

5-148 REPAIR STROBEX TRACKER (AVIM) 5-148

INITIAL SETUP



Applicable Configurations:
All

Tools:
Electrical Repairer's Tool Kit,
NSN 5180-00-323-4915

Materials:
None

Personnel Required:
68F20 Aircraft Electrician
67U30 Inspector

References:
TM 55-4920-402-13&P

Equipment Condition:
Off Helicopter Task

---

1. Repair Strobex tracker (TM 55-4920-402-13&P).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

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By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

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PFC JOHN DOE
CO A, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

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BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 Cylinders. The engine on my set only has 4 Cylinders. Change the manual to show 4 Cylinders.
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the Other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got What I ordered, so the NSN is Wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE
JOHN DOE, PFC (268) 317-7111	John Doe JOHN DOE

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The Metric System and Equivalents

Linear Measure

centimeter = 10 millimeters = . 39 inch
1 decimenter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = . 15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigrams = . 035 ounce
1 dekagram = 10 grams = . 35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = . 34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 38.82 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = . 155 sq. inch
1 sq. decimenter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = . 386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = . 06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	3.94
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.365	metric tons	short tons	1.102
pound-inches	newton-meters	.11375			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN : 053349-000